Volume XIX Number 10

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DISEASES OF THE NERVOUS SYSTEM

A Practical Journal on Psychiatry and Neurology

OCTOBER
1958

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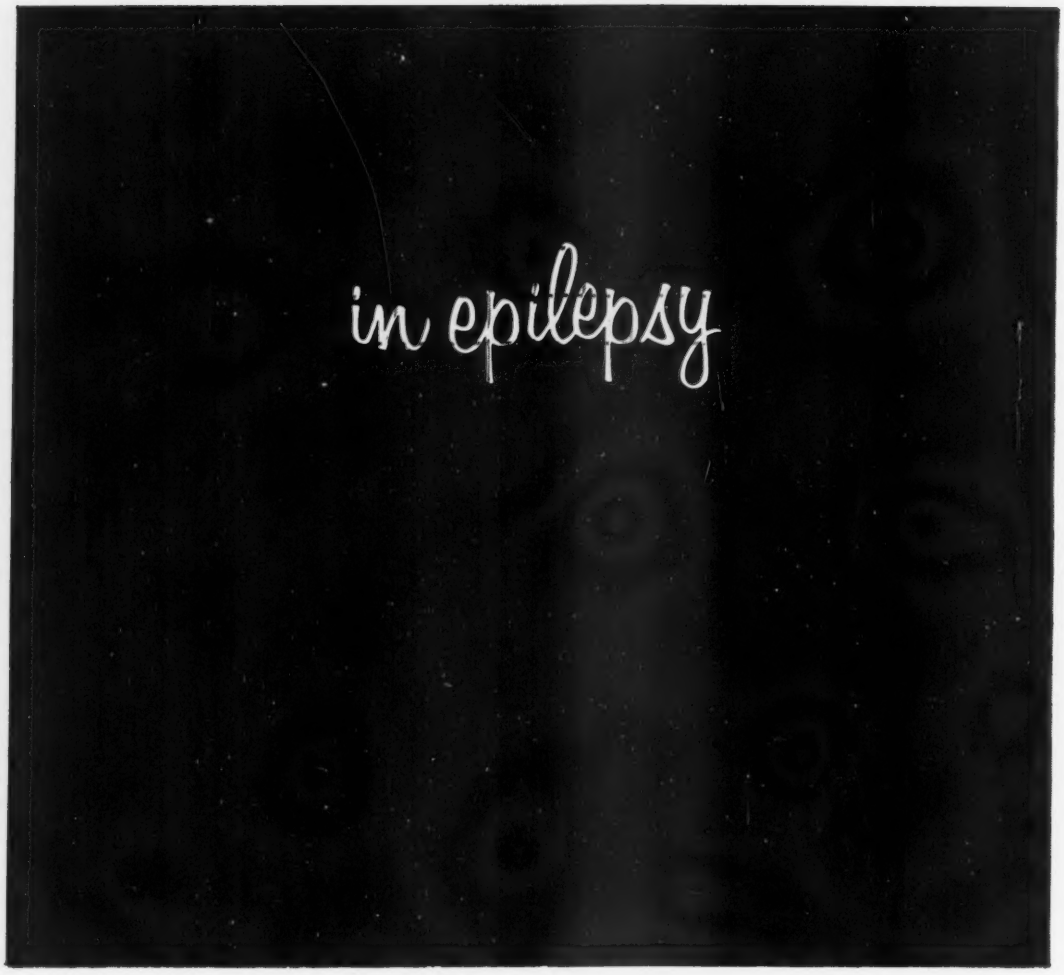

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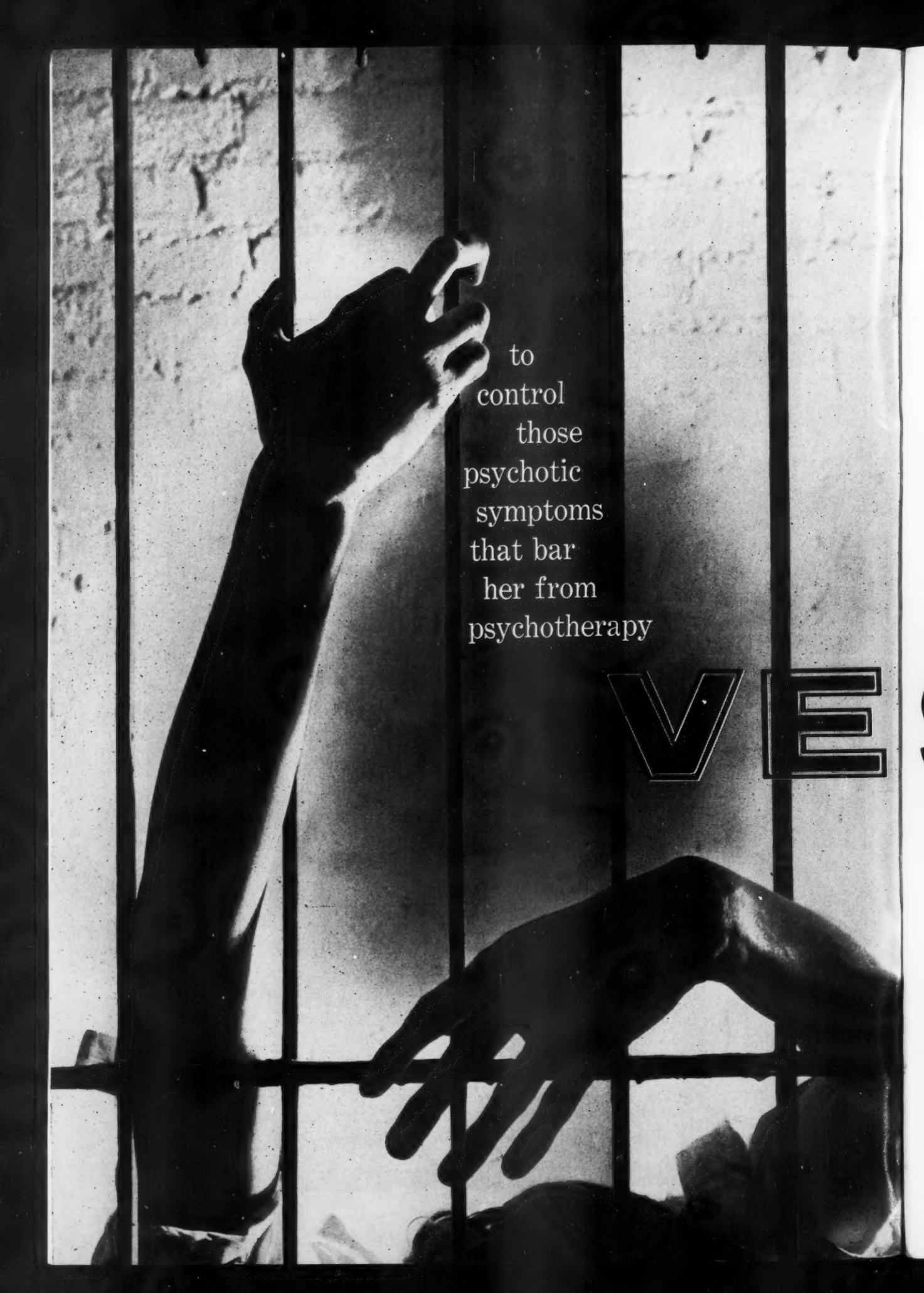
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1. Alexander, L.: Chemotherapy of depression—Use of meprobamate combined with benactyzine (2-diethylaminoethyl benzilate) hydrochloride. J.A.M.A. 166:1019, March 1, 1958. 2. Current personal communications; in the files of Wallace Laboratories.

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DISEASES *of the* Nervous System

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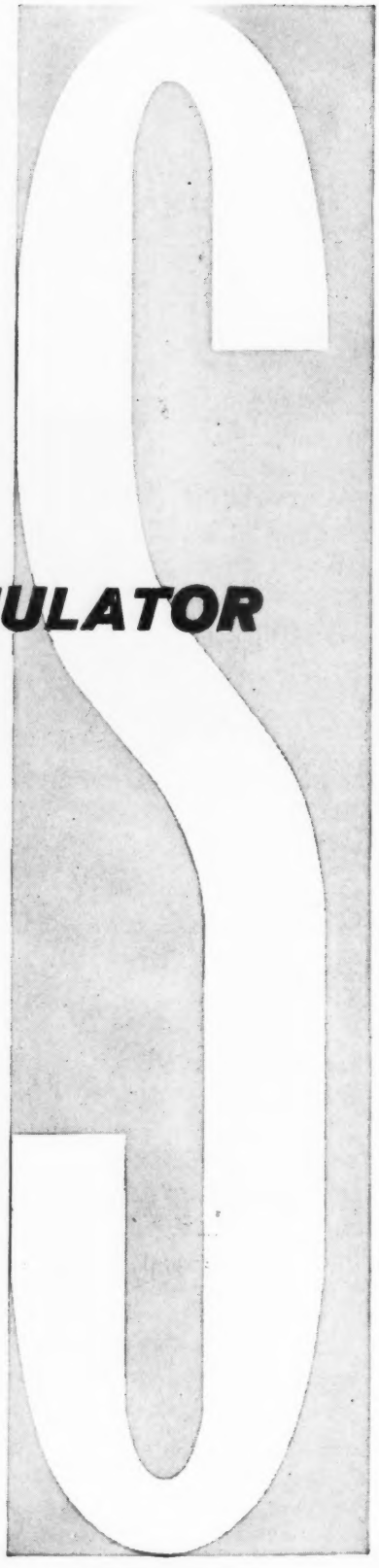

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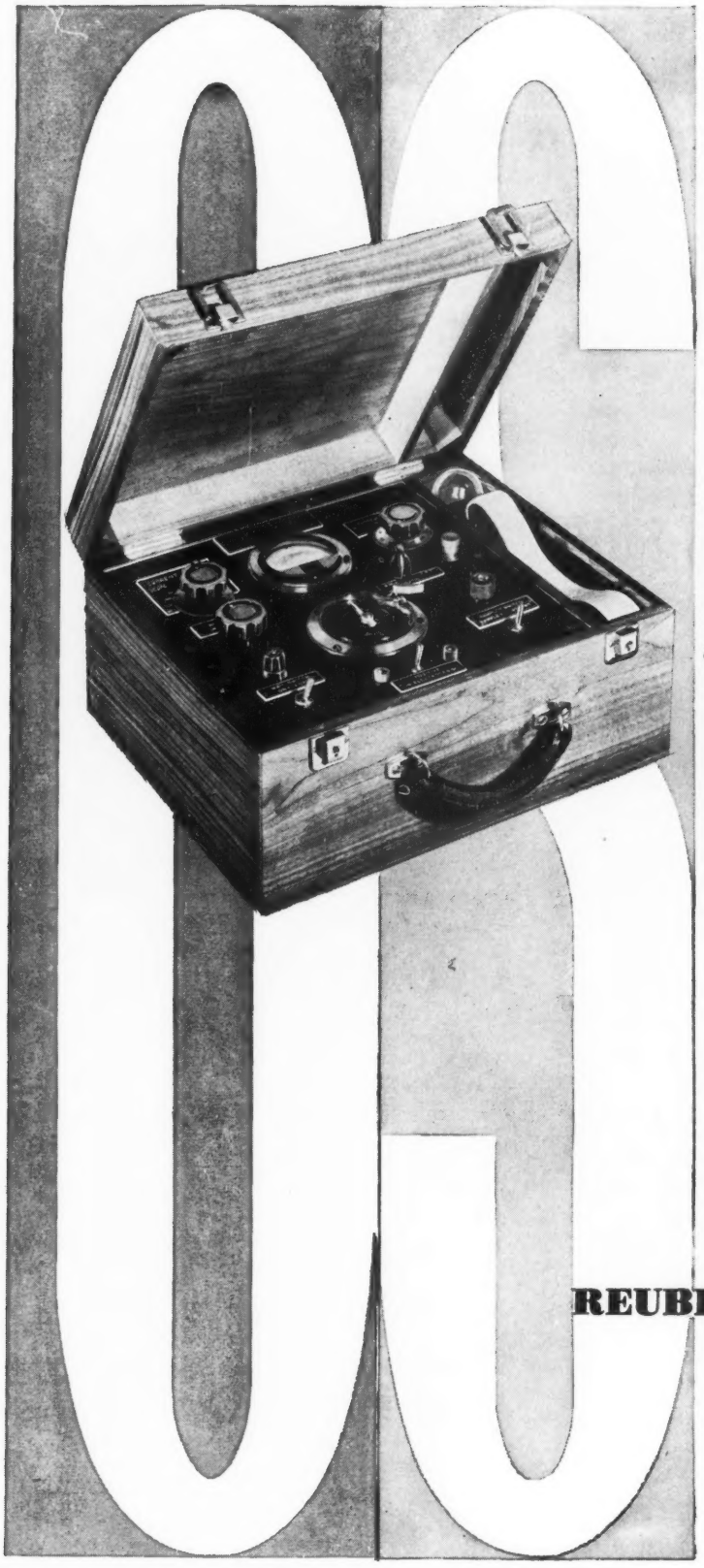

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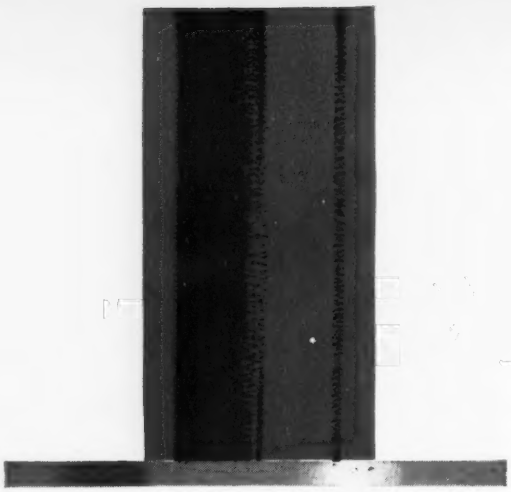

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1. Wilcox, F.: Dis. Nerv. System *19:*104 (Apr.) 1958.

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DISEASES *of the* Nervous System

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

Interpersonal Theory and Intensive Psychotherapy Procedure

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EUGENE C. MCDANALD, JR., M.D.

The subject I propose to discuss, interpersonal theory and intensive psychotherapy procedure, will be presented in the framework of the school of psychiatry which subscribes to the theory that psychic, as well as biological happenings, have interpersonal significance. This theory was first formulated by Sigmund Freud, who "taught that all our relationships with other people, including the relationship of the mental patient with his doctor, are patterned by our early relationships with the significant people of our environment in infancy and childhood."[1] Sullivan[2] made this observation of Freud the pivot for his own theoretical thinking, and proceeded to found a school of thought which is currently referred to as the interpersonal school of psychiatry.

Although the school has no fixed system of tenets, its thinking does embrace the following main ideas:

(a) *Anxiety is the central limiting factor in preventing the realization of one's potential as a person.* It precludes the use of recall and foresight in providing for basic needs, in dealing with danger, and in the use of talents and gifts. In a state of anxiety one feels lost to one's self as a real person, and a feeling of being at the mercy of evil forces is predominant.

(b) *Anxiety and the events that give rise to it, even events of a biologic or accidental nature, have interpersonal significance.* Infants and children who experience a serious illness often express anxiety after the illness in the form of a clinging parasitism to the significant person in their environment which in effect says, "Don't let this near-catastrophe happen again." Some people unwittingly act out their anxiogenic hostility in the form of accident proneness, thereby either injuring other people or taking it out on themselves in the form of a personal injury.

(c) *The principal locus for the development of anxiety is in the relationship of the infant or child to the significant people in his environment, usually the parents or the parent surrogates.* When parental disaffection is manifest in the form of disapproval of the infant or child as a person, or in insufficient interest in his basic needs, anxiety is generated which sets limits to what he feels he can and cannot do.

(d) *Anxiety and the limitations that are set up in interpersonal operations, carry over inappropriately and unwarrantably from the original anxiogenic relationships as a durable tendency toward the distortion of later interpersonal experiences.* Anxiety in later development may lead to compulsive behavior of various sorts, but common to all modifications, there is reduction of self-respect and one does not feel free to reach out in life for what one wants out of healthy self-interest. The person dominated by anxiety or the compulsions born out of anxiety foregoes his real impulses, wishes and ideas. As he relates to the significant others in the present, whom he distorts into frightening images of the past, in fear he tries to evoke their approval, or in defiance he dedicates his energies to move against them in a power-driven, destructive, egocentric fashion. If he gives up in his efforts to achieve either approval or power, he becomes ostensibly withdrawn. In such a state he may have fantasied interpersonal satisfactions in which he finds himself involved with phantom people whom he either dominates or defeats or who minister to his interpersonal needs. If withdrawal has been brought about by anxiety which has reached uncanny proportions, a person may continue to experience still further interpersonal defeats in his fantasies, but as a last resort he may surrender to stupor or a near-vegetative existence, thus giving maximal expression to his distrust of people.

(e) *Anxiety and the crippling interpersonal and intrapersonal functioning secondarily induced, may be reduced or changed by favorable life experiences, but many times the help of a person, such as a psychiatrist, is needed in order that the historical roots of the anxiety may be investigated, understood, and integrated by the sufferer to the fullest possible extent.* For the latter to occur, the person with anxiety, or let us say, low self-esteem, may be able, through the medium of the therapist's acceptance

of him, to experience an acceptance of himself that will allow him to face the unpleasant aspects of his total functioning which served no purpose other than to bind or drain off anxiety.

(f) *Intensive psychotherapy has as its goal the insightful release of the patient from both anxiety and its overt and covert manifestations in interpersonal relationships and intrapersonal processes in order that a spontaneity and self-direction in living may be achieved.*

In view of what has been said thus far, it naturally follows that the strategy of the psychiatrist doing intensive psychotherapy is to find out what the patient's anxiety is about. To do this most effectively, the psychiatrist should be free from disabling anxieties and at least intellectually aware of what most of his residual anxieties are due to. The therapist who does not have adequate insight into his personal anxieties, is seriously hindered in the all-important functions of listening to and feeling along with the patient as he presents his difficulties. It is for these latter reasons that the psychiatrist who wishes to do intensive psychotherapy, should undergo an intensive investigation of his own personality, and thereby ready himself for optimal collaboration with patients whose anxieties should be the occasion for mutual study by the doctor and patient, and not too much a source for activation of the doctor's anxiety. Even after the therapist has reduced his anxieties to a minimum, through intensive psychotherapy, when he finds himself anxious in his work with patients, it is well for him to be aware of it, both as a possible source of obstruction to his work with the patient, and as a focal point for a constructive exchange with him.

The first service that the doctor renders is in his efforts to create an interpersonal setting wherein he can collaborate with the patient to help him to get at the source of his anxiety.

Since the doctor is rendering a marketable service, he should be straight-forward in his arrangements with the patient about appointments and the payment of bills. The actual timing for the discussion of the treatment contract is a matter of choice or taste. Some therapists prefer to settle the matter right at the outset in the initial interview hour before any investigative work is started. Others prefer to wait until near the end of the first hour before embarking on this discussion.

The investigation of the patient's anxieties begins by inquiring about the reasons he has for seeking psychotherapy. If the patient indicates that he has come to the doctor's office because he was brought by either relatives or friends, or perhaps came alone, but at their insistence, it is well for the doctor not to accept the patient in therapy until the patient, either by himself or with the doctor's help, discovers reasons of his own for wishing to collaborate with the doctor in the therapeutic process. The doctor's acceptance of the patient on such terms enhances the patient's feeling that he is a person in his own right regardless of the nature of his personality difficulties.

The patient in acute anxiety finds ample reason for wishing to work with the doctor, but the person who presents a character disorder or a psychosis is frequently quite negativistic about cooperating in a therapeutic endeavor. Such patients may tax the therapist's ingenuity before he succeeds in persuading them of their need for professional help.

Once the patient has been accepted for psychotherapy, the therapist should insist on the patient giving a systematic account of his life history, and in so doing point up how he sees his problems as having developed. After the patient has given a statement of his developmental history and problems, the therapist is then free to raise questions concerning the significant gaps in the patient's life history. When the doctor has in hand the data about the patient's personal history and the problems the patient wants help on, he is in a position to render his first noticeable assistance by describing back to the patient how he sees the latter's problems. The next important effort by the doctor is to determine to what extent he and the patient are in agreement as to what the problems are that they are to work on conjointly. Without mutual validation by the doctor and patient of what the patient wants help on, the doctor and the patient could easily get lost in a maze of verbal and non-

verbal communications which might have neither meaning nor goal with regard to contributing toward the understanding and solution of the patient's real problems.

To maximize the patient's effort to reveal himself, it is a *sina qua non* that the patient be instructed as part of his contract with the physician to give expression during each therapy hour to every thought and feeling that comes to consciousness. This means that the patient will not select, in reference to the problems or the topics being worked on, what he will report to the therapist concerning his problems, regardless of whether the material he presents appears relevant or irrelevant, coherent or incoherent, or positive or negative in content and feeling tone as it pertains to the patient's interpersonal relationships, and especially to the patient's relationship to the therapist. These unselected thoughts and feelings, most commonly known as free associations, have value insofar as they relate to any of the patient's defined problems, or insofar as they serve as new material to point up new problems. The therapist should be alert to the patient's productions in order to determine with the patient whether his thought processes are leading to or away from the clarification of old problems or the pointing up of new ones.

To further increase the patient's effectiveness in getting at himself in the therapeutic work, the doctor should train the patient for detailed self-observation. He directs the patient to look back and take note of interpersonal, intrapersonal, and environmental events that precede the onset or the aggravation of uneasiness. Sullivan has indicated that the less gross indicators of uneasiness may be manifest in the form of physical tensions, fantasies, dreams and marginal thoughts—that is, thoughts that are on the periphery of what one is thinking and talking about and which are ordinarily excluded from interpersonal communication. By communicating one's physical tensions, marginal thoughts, fantasies and dreams, and the events that are recallable which preceded them, the patient not only gets a clue at times as to what is making for his tension or anxiety; he may also discover some problem-solving hunch. To illustrate: A patient of mine who had entered into an unfortunate marriage, and who had exhausted every resource in her own and her husband's behalf to make the marriage workable and durable, had a dream in which she saw her wedding ring break open and fall off her finger. Although she had been in an agitated state prior to the dream, following the dream she was calm and knew that the solution to her problem lay not in further efforts to rehabilitate the relationship, but in divorce.

It is wise to let the patient know early in therapy that he is responsible each hour for the initiation of the work on his problems and for the continuity of the work. When the patient blocks, it is up to the therapist as a participant-observer to assist the patient in finding out where the anxiety developed that occasioned disruptions of the work.

As the patient reveals himself through the media of day-to-day problems, fantasies, dreams, marginal thoughts and physical tensions, both the patient and therapist note that in many instances the same problem is recurrently touched on by all media. This strongly suggests that "the organism as a whole," to borrow Adolph Meyer's phrase, has a natural tendency to restate old unresolved difficulties. Freud noted years ago that until a problem was solved, it tended to repeat itself. He pointed up that a person with an unsolved interpersonal problem would unwittingly involve himself in current relationships in such a fashion that the original anxiogenic relationships with significant people in his early development would be in essence reproduced.

When the patient involves the doctor in the psychotherapeutic situation so as to reproduce an old interpersonal conflict, the repetition of the interpersonal problem with its attendant thoughts, feelings and actions, is what Freud referred to as "compulsive transference." The patient, in transferring his problems into his relationship with the therapist, risks the possibility that they may be defined, clarified, and resolved in relationship to the therapist so as to reduce the anxiety that has been the energizing factor in the problems' repetition.

In working on transference problems, the resistance presented by the patient in his effort to uncover the basis for his trouble-

some interpersonal patterns, is in very rough measure directly proportional to the anxiety behind his maladjusted behavior and inversely proportional to the acceptance the doctor emphasizes as he works with the patient. The doctor who can accept and investigate the patient's distortions of him with benevolent neutrality, will intuitively behave opposite to the negatively significant people in the patient's life, and in so doing he will avoid being a contributing participant to the patient's unhealthy repetitive patterns. The doctor's acceptance of the patient's difficulties for serious investigation frequently may have a telling effect on the patient who is pleasantly shocked into the realization that at long last he has discovered someone who both takes him seriously and treats him as though he can learn to act responsibly as a self-respecting person.

Many times a special aspect of the attitude of benevolent neutrality is required of the doctor before the patient is brought to realize that he can give up the use of his unhealthy interpersonal maneuvers in relationship to the doctor. This special aspect might be referred to as a benevolent matter-of-factness. It is called forth when the patient interprets a reality situation between himself and the doctor in such a way that he distorts the situation in terms of his fears or wishes. I recall, for example, how a problem situation developed between a patient and myself, when my role changed from one of being a relatively active participant in the therapeutic process to one of being relatively inactive as the patient progressed from a help-seeking phase to a phase where her own curiosity seemed to be a sufficient stimulus for the effort she made to get at her problems. During an hour when the patient, from my point of view, was working well, she suddenly turned on me to say that she didn't appreciate my being silent, and that if I wanted to terminate her therapy, why didn't I say so directly. Knowing that the patient had touched several times in previous sessions on the meaning of her mother's and father's silence as being indicative of total rejection, I wondered aloud if my silence might imply other possibilities than that of rejection. Her response suggested she didn't hear me, inasmuch as she proceeded to berate me for being largely silent for the last several sessions and, after exhausting her berating remarks, she again insisted on my being direct with her if I wanted her to leave therapy. When the patient finished, I said in a very matter-of-fact tone of voice, "You are very angry and very frightened, but understand I am not your mother or father, and my silence has simply meant that you have been working very effectively on the problem that you were discussing." The patient burst into tears and said, "I thought you were going to kick me out. I can't believe you—you mean you are not going to kick me out? I must believe you or I can't go on." I then said, "Let's relax for a few moments while you tell me what grounds I have for kicking you out." She paused for several seconds, and then said slowly and with great relief, "I do believe you when you say that you were silent because I was working on my problems in a satisfactory way."

The example I have just given to illustrate the importance of the doctor's matter-of-factness, points up an important correlative fact: that is, the most convincing interpretations to the patient's and the doctor's behavior grow out of the doctor-patient relationship. In that relationship, the evidence of the patient's irrational behavior is immediately at hand, and the patient cannot easily evade such evidence by employing rationalizations which he has recurrently used to explain away similar behavior in other interpersonal settings. The doctor's direct confrontation of the patient with his patterns of reality distortion in the framework of the doctor-patient relationship, and the clarification of what is actually happening in that relationship, has often the effect of insight which is characterized by an initial reaction of shocking surprise progressing to a feeling of great relief. The doctor's confrontation may be in the form of a direct interpretative statement, or in the form of a question which puts the burden of the interpretation on the patient.

In the hasty outline of the essentials of therapeutic procedure which has just been concluded, the essential core of the psychotherapeutic work was glossed over. For a few moments now, I would like to discuss what this essential core embodies, first, as

it pertains to the facilitation by the therapist of self-revelation on the part of the patient, and second, as it relates to what Freud called the working-through process.

The task of revealing one's self to another person is easy when it is felt that approval is forthcoming. It is extremely difficult when disapproval is anticipated. It is almost impossible when it is connected with feelings of imminent devastation. The patient who anticipates either disapproval or devastation, is under pressure to communicate or act, but in a state of anxiety, he needs special help to do either.

The task of the therapist is to help the patient communicate that which the patient fears will lead to his disapproval or devastation. In so doing, he takes note of the occasions when the patient expresses his anxiety about his thoughts and feelings through the medium of silence, and he says quietly to the patient, "Let me in on it." He heeds the patient when the patient indicates that the topic of the moment is creating too much anxiety, and he says, "We'll tackle this again when you feel more like coming back to it." He senses the patient's uneasiness as he strains to reveal something about himself that he fears will evoke disapproval, and he raises the question, "What do you imagine I would think of you, if you told me what's on your mind?" When the patient expresses disappointment in the results of therapy, he says, "Would you like to comment about the way you feel I may have failed you?" (Here, of course, the doctor is obliged to confirm anything the patient says that is regarded as valid.) If the patient tries to make the doctor feel powerless, he inquires, "Would you feel better if I felt inadequate?" To the patient bent on receiving personal favors, he submits, "Why is it important to you that these favors be granted?" In the event a patient insists on a sexual relationship with the doctor, he says, "We both know that physical contact between us is out of the question, but let's find out all that we can about what's involved in your feelings about me." In case the patient persists in needling him, he wonders aloud, "What fun do you get out of this?" After being lambasted irrationally by a patient, he queries, "Do I remind you of someone in your past?" When it is surmised that the important aspect of the patient's effort is the way he is working, that is, the way the patient is unwittingly using the content of his remarks to evoke, for example, an ego-bolstering response from the doctor, the doctor gives vent to the "hunch," "Is there something you want from me that is perhaps more important than the problem you have been talking about?" It should be said at this point that the therapist's facilitating remarks may be varied considerably from the examples given, since each depends on what's occurring in the context of the doctor-patient relationship at the moment.

After bringing to light the patient's anxious thoughts and feelings, or should I say, his personality patterns, trends and needs that are part and parcel of his problems, the important thing is for the patient and the doctor to work on and through each of the patient's difficulties until they are seen in a meaningful perspective. To assist in the achievement of this objective, the doctor helps the patient by means of focusing remarks to keep each problem on the level of conscious awareness until it is resolved, partially or completely, by an anxiety-reducing interpretation advanced by either the doctor, the patient or both together. In his interpretative efforts, the doctor should be a wise and practical educator, and for him to be adequate in this respect, his knowledge of the dynamics of normal development should be equal to his understanding of psychopathology. Let me offer in connection with these points concerning the doctor's role in making focusing and interpretive-educative remarks, a simple illustration:

A patient recently came into my office in a more jovial mood than usual. He reported that everything in his life was going fine, and he wondered if he could cut the number of appointments from three to one a week. I told him that I had not heard him at any time prior to this hour express such confidence, and suggested we make an effort to find out what had contributed to his improvement. He paused for several seconds, and then said in a serious but belligerent tone, "I did have something to talk about, but I worked it out by myself and there's no point in talking about it now." I responded to his disclaimer by saying, "You are obviously upset about something, but let's both come back to why you are upset when you feel more like sharing your problem with me. Right now we can

pick up on the reasons for your hostility toward your father that we were working on at the last hour." After I gave the patient permission to defer the presentation of his present upsetting problem, he glanced at me, then turned his head away and said, "It's hard to talk about—it's the hardest thing —I don't believe I can talk about it." I again assured him that we could defer the discussion if that was his wish. He then looked at me and said, "The simple fact is that I have homosexual tendencies." I asked him how he had come to this conclusion. He then, with great difficulty, gave the basis for his notion. He said, "Since I've been seeing you— I just can't say it." There was a long pause, and then he resumed, "Since I've been coming here I've had feelings, almost uncontrollable feelings, that I wanted—oh, to hell with it." An extended period of silence followed, and during it the patient stared at the floor. This time I simply reflected the patient's wishful phrase, "I wanted." He picked up my reflection immediately and gushed out, "I wanted to touch your penis, but don't take it personally; you're not the first person I've had the impulse to do this to. Before I started seeing you, I wanted to do this to the doctor on the ward. I've known since I first felt this urge that all my problems centered around homosexuality, and I've been putting my attention on everything I could lately to get away from the fact, and I pretty well succeed in getting away from it, except when I come here." In my reply to the patient, I said, "To discuss your urge to touch my penis as a symptom of homosexuality won't help at this point, but to find out if the urge was felt prior to your experience with the doctor on the ward, may throw some light on what that urge means." For several sessions, the patient continued to be anxious about the possibility of his having homosexual tendencies, but during each of these sessions he failed to get at other memories that would throw light on the development of the urge. On the day of the seventh session of our work on this problem, he came into my office in a near panic, and said, "I know I'm a homosexual now. Yesterday I was in the bathroom and I saw one of the other patient's taking a leak. My impulse was to reach over and touch his penis. Then, in sort of a blur, I recalled that when I was about three years old, that father slapped my hand for trying to touch his penis. He must have seen that I had homosexual tendencies, because he has always said he would make a man out of me or else he wouldn't own up to my being his son." I countered the patient's interpretation with this remark, "Did it ever occur to you that it is normal for a child to want to explore his own body and the bodies of other people, all for the sake of satisfying a healthy curiosity about how he and other people are made? I'm sure that your father belonged to the old school and didn't understand the normality of your behavior, and as a result of his slapping your hand, you felt that you had done something that was bad. When you had the urge to touch his penis, you wanted your behavior to be accepted, and I think what you have wanted from the ward doctor and from myself is a fatherly acceptance and understanding of you and your impulses which you felt was missing in many instances in relationship to your father." The patient's rejoinder to my statement was, "If I had only been able to talk to my father like I have talked to you, I wouldn't be here today."

It was pointed up early in this paper that intensive psychotherapy has as its goal the insightful release of the patient both from crippling anxiety and its overt and covert manifestations in interpersonal relationships and intrapersonal processes. May I refer again to the patient who panicked at the thought of being a homosexual. Later he made the statement to the effect that he wished he could have been as free in his relationship to his father as he was to the therapist, he consented to become one of three patients who would meet together for group therapy sessions. In the first meeting he spontaneously catalysed the flow of material in the group as a whole by giving first the sequence of the developments that made him think he was a homosexual, and then the essence of his exchange with the therapist that enabled him to get a normal perspective on his behavior. I bring up this example from group therapy to show that when there is insightful release from the cause of anxiety, the problem that was once a horrible secret becomes an integrated part of one's self that can be shared.

The question may be properly raised as to when the working-through process can be reasonably brought to a halt. A rule of thumb which I would like to suggest is this: When the doctor and patient agree that the patient is reasonably spontaneous, objective and comfortable in the discussion of his problems and in his interpersonal relationships, the patient may be considered ready to leave therapy, either for a temporary or an indefinite period. Regardless of which decision the doctor and patient agree upon, the doctor's self-esteem should not be injured if the patient feels a need to return for further therapeutic work on either old or new problems. The doctor can only give his best efforts to his patients—he cannot guarantee them complete success in their endeavor to find a new and more meaningful way of life.

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Acute Toxic Psychosis Due to Scopolamine

(A Case Report)

LAURENCE R. MUNDY, M.D. and WILLIAM W. ZELLER, M.D.

Although the cerebro-toxic effects of scopolamine are widely known, and it is accepted that patients may show idiosyncrasy to therapeutic doses of this drug,[1] there are remarkably few cases of acute toxic reactions to scopolamine reported in the literature. Obstetricians expect most patients who are given scopolamine during labor to show some transitory confusion and excitement and similar reactions are reported by anesthesiologists. Peterson and Haynes[2] in 1904 reported 23 cases of poisoning due to atropine alkaloids. Eight of these exhibited delirium, one showed "screaming hysteria," and one experienced hallucinations. Hughes and Clark[3] in 1939 reviewed the literature and reported two cases of stramonium poisoning following the ingestion of jimson weeds. Both of these cases showed "acute delirium" for about twenty-four hours.

Wertham[4] has described his own sensations after receiving 1/150th of a grain of scopolamine pre-operatively. He reported suffering "deterioration of comprehension." He described himself as having felt like a child among adults, unable to understand many things that were going on around him. He was particularly impressed by the fact that although he could see a clock clearly during the operation, he was unable to read the time. Wertham also experienced dissociation of his mood and behavior. He experienced severe feelings of insecurity and apprehension, but simultaneously he expressed euphoria by laughing a great deal and telling funny stories. He was also informed afterwards that he spoke about many things which, in his own memory, he had only thought about.

Monroe, Jacobson and Ervin[5] describe the action of 500 mgm. of chloralose and 0.5 mgm. of scopolamine given by mouth to selected volunteers and neurologic and psychiatric in-patients. There was activation of an EEG pattern compatible with their diagnosis in the case of the patients and exacerbation of psychotic behavior in the psychiatric patients. This was characterized by "Rageful acting out, depersonalization and confusion, and rarely by hallucinations and delusions."

Recently we have observed a case of toxic psychosis due to scopolamine. Our patient experienced a relatively prolonged psychotic episode with vivid hallucinations after receiving a therapeutic dose of scopolamine.

Case Report

A 32 year old married woman was admitted to the Institute of Living on June 10, 1956 as an emergency. During the year prior to admission, she had suffered four attacks of right upper quadrant abdominal pain, suspected to be due to acute cholecystitis. On May 30, 1956, she experienced a similar attack. As her family physician was away at the time, she was seen by a different doctor who administered 1/6th grain morphine sulfate and 1/150th grain scopolamine by injection. On the morning of June 7th she awoke early and complained of insomnia. She told her husband that "strange things are going on around here," that her doctor had come into the room with a strange woman, that her sister had come into the room and talked with her during the night, and that she had seen bugs crawling on the ceiling. Although the husband was puzzled by her remarks, no further attention was paid to them. She remained fairly well during that day until evening, when she vomited her supper. She was again seen by the doctor and given a similar injection. The following morning on June 8th,

From the Institute of Living, Hartford, Conn.

she awoke early complaining that she had slept badly. She appeared anxious and said, "The whole room is wired; the bedspread is wired for electricity." She told her husband the doctor had been in the room all night and had been giving her shots in the back; also, that one shot had been put in her toe. She complained of an electrical machine being placed on the side of her bed and said, "Don't touch me, you will get a shock." While speaking to her husband, she appeared to be having visual hallucinations. She talked to a non-existent other person whom she saw in the room. She was taken to her mother's house and throughout this day she remained anxious, apprehensive, and continued to hallucinate. The following day she was seen by her own family physician. She was disturbed and expressed dislike of her dog, a previously well loved pet. That night she was restless and occupied herself by hiding her personal possessions, such as hair brushes and slippers, in unusual places. She was seen in consultation by a psychiatrist who recommended immediate hospitalization.

During the journey to the hospital, she continued restless and complained of children hanging on the side of the car. Her speech was disconnected and she shouted at people whom she thought were trying to enter the car. Her husband was convinced that she was seeing things. On admission, review of her background revealed no history of mental illness in the family. Her personal history contained no significant information regarding difficulties in interpersonal relationships except for the fact that she did have some anxiety about her inability to have children. Examination of her mental status showed the patient to be severely excited. She was well nourished and did not appear dehydrated. Her speech was rapid, overproductive and disconnected. She was disoriented as to time and place but not as to person. She misidentified those around her. She was admitted to a disturbed unit where she said many times that her pet dog was in the room with her and that small bugs were crawling over her body. She also complained of a feeling of tingling in the skin "like electricity in my body."

Physical examination revealed no significant abnormality. The neurological examination was within normal limits. Multiple x-rays of the skull showed a calcific density which appeared to represent a bone island in the greater wing of the sphenoid. The electroencephalogram was normal. The electrocardiogram showed a depressed ST segment in L2 and L3, AVS, V5 and V6. The T wave was flattened in L1. There was a prominent U wave or positive after potential in leads V2 to V6. These readings suggested an electrolyte imbalance, particularly potassium deficiency. A course of Thorazine was commenced and within 24 hours the dosage was raised to 800 mgs. daily. Fluid and vitamins were given by mouth and a mixed vitamin B preparation was administered intramuscularly. Twenty-four hours following her admission her symptoms were unchanged. After 36 hours, the patient showed a response to treatment. She became calmer and more relaxed; she was able to speak in a rational manner and to identify her surroundings correctly. She was still disoriented in time and space but understood when she was informed of her whereabouts and the date. She was able to remember her physician. Physically, she was weak and fatigued. On June 13th, 48 hours after her admission, she was transferred to a semi-disturbed unit and on June 15th to an open convalescent unit. At this time there was no further evidence of psychosis and apart from her most severe psychotic episodes, her memory was intact. With retrospective insight, she vividly recalled the details of her illness. A cholecystogram was performed on June 26th. Her recovery continued uneventfully and she was discharged on June 29th.

One month after discharge, her family physician reported that her abdominal pain had rapidly subsided and that she was making a successful adjustment at home and that there had been no further symptoms.

Summary

A case is reported of an acute toxic psychosis following the administration of therapeutic doses of scopolamine. The patient was disoriented and confused and experienced vivid hallucinations of a visual and kinesthetic nature for four days. Her condition responded rapidly to the administration of chlorpromazine in large doses together with hospital care, fluids and nourishment.

The literature is reviewed.

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Combination Reserpine-Methylphenidate in Epileptics with Psychosis

(Final Report)

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Originally the authors reported the results of a 16 week pilot study in which a combination of reserpine-methylphenidate was used in the treatment of a group of psychotic epileptic patients.[1] It was found and reported that in the 26 patients studied a remarkable improvement occurred in patients with symptoms of hyperactivity, overtalkativeness, assaultiveness, destructiveness, and anxiousness; also, the individual personality changes made the patients more accessible for activities, recreation, and other interpersonal socialization.

The study was continued for a period of 15 months and this paper reports and summarizes the results of the clinical experiment.

Method of Study

Throughout the 15 month period, 30 female patients with epilepsy, cared for on one of the chronic wards of the hospital, were included in the study. The age of the patients ranged from 16 to 64 years, with a median age of 39 years. The duration of hospitalization extended from one month to 30 years, with a median duration of 9.4 years.

Table I summarizes the diagnostic categories of the 30 patients.

TABLE I

Diagnostic Categories

Diagnosis	*No.*
Chronic Brain Syndrome Associated with Convulsive Disorder (Idiopathic)	19
Schizophrenic Reaction, with Associated Convulsive Disorder	6
Mental Deficiency with Associated Convulsive Disorder	4
Chronic Brain Syndrome due to Infection, Post-Encephalitis, with Convulsive Disorder	1

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Authors' Note: Reserpine (Serpasil) and Methylphenidate (Ritalin), used for this study, were supplied by CIBA Pharmaceutical Products, Inc., Summit, New Jersey.

Observations: Ward behavior was recorded by psychiatric nurses in charge of the ward on which the patients resided. Symptoms of hyperactivity, overtalkativeness, assaultiveness, destructiveness, agitation and tension were rated daily during the study, employing the same rating scale that the authors had found successful and effective in other clinical experiments.[1,2] Likewise convulsive seizures were recorded during the study.

Medications: At the beginning of the study all patients were taken off anti-convulsants and each placed on reserpine, 4 milligrams daily, in a single dose, along with methylphenidate, 30 milligrams twice daily. In the initial 16 weeks of the study the authors found that in most patients this large a dose of reserpine, and larger doses, as high as 10 milligrams a day, were not well tolerated by psychotic patients with convulsive disorders, and likewise when the reserpine medication was reduced to 2-3 milligrams daily, the incidence of convulsive seizures, which had increased initially, on large doses of reserpine, decreased remarkably, and to a point below the frequency rate prevailing before the study was started. This would seem to verify the observations of Barsa and Kline, which was reported earlier.[3]

Consequently, the four new patients, as they came to the epileptic ward, were started on two milligrams of reserpine daily, and they continued on this dosage throughout the study. The four new patients received the same dosage of methylphenidate, 30 milligrams twice daily, throughout the study, in addition to one-half their previous dosage of anti-convulsant.

One, two and four milligram reserpine tablets, and ten and twenty milligram methylphenidate tablets were used as medication, along with the usual anti-convulsant medications, such as, phenobarbital sodium, diphenylhydantoin sodium, methyl - phenyl -

ethyl hydantoin, primidone, and trimathadione.

Withdrawal of Anti-Convulstants: In the initial study, the anti-convulsant medications the patients were receiving were gradually withdrawn after the project started. The method of withdrawal was outlined in the original report. As the study progressed, the authors did not attempt the withdrawal of the anti-convulsant medications completely, but rather reduced the amount of the anti-convulsants the individual patient was receiving. Likewise, when anti-convulsants had been completely withdrawn in the first 16 weeks and represcribed for the patients as the study continued, the amount of the anti-convulsants was reduced below the previous individual dosage levels.

At the beginning of the eleventh month of our study identical placebo medications for reserpine and methylphenidate were substituted without the knowledge of the patients or the ward personnel, including the attending physician.

Results

At the beginning of the study, when anti-convulsant medications were withdrawn from the subjects, the incidence of convulsive seizures increased in 15 patients so that it was necessary to represcribe the anti-convulsant medications. The other 11 patients were carried only on the combination of reserpine-methylphenidate, without an increase in the number of convulsive seizures throughout the 16 weeks.

Subsequently, as more clinical experience was gained, all of these 11 patients were replaced on anti-convulsants. As a result, the incidence of convulsive seizures further decreased.

With all the original 26 patients, when the anti-convulsants were re-added, these medications were represcribed at half of the previous dosage level. In all cases, with this reduced amount of anti-convulsant medication, plus combination reserpine-methylphenidate medications, the incidence of seizures was reduced by 30-40 per cent.

Likewise, the attempt to discontinue anti-convulsants was discarded; however, as the four new patients became a part of the study, the dosage of anti-convulsant medications was reduced by half when the patients were started on combination reserpine-methylphenidate. The incidence of seizures decreased 50 per cent in these four patients. The personality characteristivs of all 30 patients changed remarkably during the study.

The five rated symptom categories were for the most part moderately to severely present before the patients received combination reserpine-methylphenidate. All these rated symptom categories decreased during the study, to the point of being entirely absent in most of the patients; on the other hand when they were present, they were rated only as mild.

The patient's individual personality changes were even more dramatic. Whereas many of the patients were irritable, cantankerous, impulsive, demanding and hostile before receiving combination reserpine-methylphenidate, they all became more pleasant and cooperative on the drug. Consequently, interpersonal relationships between patient and patient and patient with ward personnel were greatly improved. The bettered personalities made the patients more accessible toward occupational therapy activities and recreation.

Previous to the study, the degree of extreme behavior had confined these patients to the ward most of the time. When taken from the ward, the patients had to be closely supervised. As the experiment progressed, half the patients were given unsupervised full ground privileges, and consequently, this group of patients spend the greatest part of their waking hours off the ward. The other patients needed less supervision when they were taken to the hospital rehabilitation programs in which they became more active participants.

Probably the most significant aspect of the change in the behavior of the patients was noted when the placebo medications were substituted for reserpine and methylphenidate. As stated, this was done without the patients or the ward personnel, including the attending physician, having knowledge of the switch in medication. By the fifth day following the substitution, behavior of the patients had reverted to the previous clinical picture before the study was commenced. The ward became noisier,

the patients were more aggressive and overactive; the incidence of seizures increased once again. An appropriate comment from one of the psychiatric aides on the ward seems worthy to mention: "It's easy to overlook the changes in the patients. Now I remember how the ward was before the research project began."

The ward personnel became increasingly concerned and upset and began suspecting that placebos were being administered, so that on the seventh day of placebo medication, the fact was divulged, and at the same time, real medications of reserpine and methylphenidate were resumed. Gradually over a period of one week the ward picture reverted to the same as before the placebos were used, and by the end of another week, the ward was quiet, peaceful and happy; accordingly, the incidence of convulsions decreased again.

Discussion

The extended 15 month study emphasizes and affirms the authors' original impressions. Combination reserpine-methylphenidate therapy is valuable in the treatment of the chronic hospitalized epileptic patient. Although initially it was recommended that anti-convulsants be withdrawn and discontinued whenever possible, the extended study has led to the impression that this is not advisable; rather than discontinue the anti-convulsants, a reduction of these medications by half the previous dosage, with the addition of reserpine (2-3 mgs.) and methylphenidate (30 mgs. twice daily) in small doses, offers the patient greater psychic stability and less convulsive seizures. It is not to be inferred that reserpine-methylphenidate are specific anti-convulsants in epilepsy. However, when the epileptic patient is properly tranquilized, the emotional releases manifested as seizures are less likely and hence, anti-convulsant medications can be reduced accordingly. This has been further corroborated by Brooks,[4] who reported reserpine a safe and effective agent in the treatment of epilepsy. This investigator also used methylphenidate in his patients to offset and minimize reserpine side effects. In his study, convulsive seizures were decreased one-third. Livingston[5] has also reported that reserpine is an effective agent in alleviating behavior disturbances in children with epilepsy. Rosenberg[6] in his study with adult epileptics found almost 100 per cent improvement in mentation following reserpine medication, and in addition 10 of his 19 patients showed a decrease in the number of convulsive seizures.

It should be further emphasized that the original observation of Barsa and Kline has been supported by this 15 month study, in that psychotic epileptic patients require less reserpine medication than other types of psychotic disorders.

Summary

In this group of psychotic epileptic patients, most of whom had been long considered as the most difficult management problems in a large state hospital, the combination of low doses of reserpine with methylphenidate resulted in an improved social milieu of interpersonal relations between patients with other patients, patients with personnel, as well as personnel with personnel, better control of convulsions with reduced anti-convulsant medication, and participation in a greatly extended and richer life plan of activity and independence for all patients.

This regime is recommended for extended evaluation trials as routine procedures in larger epileptic hospital population.

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Use of Perphenazine in 100 Hospitalized Patients

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Perphenazine, a chlorphenothiazine derivative, closely related to thiopropazate, was used on a hundred patients at the Danvers State Hospital. Seventy-five percent of the patients were disturbed, and had been in the hospital more than two years, and the remainder were cases new to the hospital. Of the chronic group a third of the patients are still on the drug after six months or more.

Dosage. Daily starting dose varied between 32 and 64 mg. in almost all patients, although a handful were started on less, and a few of the extremely disturbed were given up to 128 mg. Average starting dose was 43 mg.; maintenance dose averaged 29 mg.

Composition of Group by Psychosis. Of the 71 patients (71%) were schizophrenes, 16 had mental deficiency with psychosis and eight had chronic brain syndrome. Of the remaining five patients, three had manic-depressive psychosis and two involutional psychosis.

Results. Of the chronic group 50 of the 75 patients were discontinued from the drug, 21 were discontinued due to parkinsonism and 23 were discontinued due to the fact that there was no improvement, or minimal improvement. In all these patients ataractic treatment with other phenothiazines or reserpine had been of no more than minimal effectiveness. Miscellaneous side effects accounted for the remaining six patients taken off the drug. Six of the chronic group had mepazine added.

Of the chronic patients who remained on the drug four improved sufficiently to leave the hospital and two went from "back" to convalescent wards. Seven patients improved moderately and the remaining twelve show slight but continued improvement. One of the patients who went home had mepazine added as also did one on the convalescent ward, and two each of the moderate and slightly improved groups.

The recently admitted patients showed an entirely different picture. Two of these patients were taken off perphenazine because it was ineffective and two due to extrapyramidal symptoms. Four were taken off the drug because it was ineffective. Five patients went home and three were improved sufficiently to be put on open wards. Six patients were improved moderately and seven were slightly but consistently improved. One of the patients who went home was also on mepazine, as was one of the patients on the open ward. Two of the moderately improved group were on mepazine.

Side Effects: 41% of the patients exhibited parkinsonian symptoms in some degree and 23% were taken off the drug for the reason that it could not be given in sufficient dosage due to parkinsonism. The more severe effects usually occurred where a daily dose of 48 mg. or up was used. Ten patients of the total group were given mepazine in combination to reduce parkinsonism, and included cases which had been started on mepazine and were given perphenazine to counteract the vagolytic effects of the mepazine; the combination was also given in these ten cases to enhance the clinical effectiveness by using this synergistic combination.

There was one case of neurocirculatory collapse, one rash, one case of dysphagia. Two patients developed grand mal type seizures and two were stuporous.

Neither leukopenia nor jaundice were observed. Four patients who had had leukopenia on other phenothiazines were given perphenazine without leukopenia developing.

Aggravation of symptoms was noted in three patients, with agitation and depression. However four patients, agitated on other ataractics, improved on perphenazine.

Discussion

At the time the perphenazine study was started five other phenothiazines were in use. Perphenazine added another string to the therapeutic bow because it differed from the others. Although closely related structurally to thiopropazate, perphenazine seems more similar in its pharmacological action to prochlorperazine, but there are differences between the two. Most notably perphenazine does not seem to cause the restlessness and insomnia which in some cases make prochlor-

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perazine seem like an overdose of a euphorient. It seems neither to decrease nor increase affect, and it is therefore indicated in cases where affect change is not desired.

In doses over 40 mg. daily, extrapyramidal effects are marked and it is not often possible to go to dosage levels over 48 mg. daily. For those who believe, like Kruse,[3] that the optimum effect of a phenothiazine is only reached when extrapyramidal symptoms are manifested, this is advantageous. It is disadvantageous for those patients who need large doses to flatten their affect, but, as stated, the drug does not flatten affect particularly, an advantage in other cases.

Perphenazine seems to cause less agitation and depression than was observed with chlorpromazine, reserpine and thiopropazate. The observations of Marangoni[4] and Settel,[5] in this respect, are confirmed. For this reason combination with mepazine in certain cases is advantageous. Neither drug alone appears to dull affect particularly and the synergistic combination works in the same manner with fewer side effects and more results than either drug used alone. This synergism is in accord with that noted by Bowes[2] with chlorpromazine and mepazine.

Summary

1. Observation of 100 cases in which perphenazine was used show it to be an effective ataractic, one of the three phenothiazines that does not cause agranulocytosis.

2. It is particularly advantageous in that it does not produce great flattening of affect, and not particularly advantageous where high dosages are necessary to produce great flattening of affect.

3. It produces less depression and agitation than four other sympathicolytic ataractics used.

4. Perphenazine works well synergistically used with mepazine and the combination does not tend to produce stuporousness or lethargy in combination.

5. Comparatively low doses are effective.

Author's Note: The drug, under the trade name "Trilafon," was supplied by the Schering Corp., Bloomfield, N. J.

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Factors in Patients' Failure to Return to Clinic

JAMES M. A. WEISS, M.D., and K. WARNER SCHAIE, PH.D.

Professional personnel at most psychiatric clinics are concerned, as we are, with the important proportion of patients who "break treatment" and fail to return to the clinic for further care. For this reason, 603 consecutive closed case files accumulated over a two-year period (from October 1954, when the clinic opened, to October 1956) at the Malcolm Bliss Psychiatric Clinic, St. Louis, Missouri, were examined with respect to the characteristics of the patients and their therapeutic courses. Of the 603 cases, 373 patients were considered to have "successfully" completed their clinic program, i.e., they were discharged after the completion of evaluation and/or treatment, and were either returned to the community or were referred to another agency for further care. The remaining 230 patients failed to return to the clinic for further treatment or disposition although each patient had been given a definite appointment.

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Characteristics of the Total Patient Group

The total patient group ranged in age from 16 to over 75 years, with a median age of 39 years, and all patients were white. Bliss Psychiatric Clinic does not admit children, and until late 1956 did not admit non-whites. Females predominated with a ratio of 3:2.

Patients were predominantly Christian (with Roman Catholics and Protestants in almost equal numbers) and predominantly native-born. Most patients were indigent or day laborers, although there were a few white collar workers, and almost all came from the lower or lower-middle socio-economic classes. Half were married, one quarter single, and one quarter were separated, divorced, or widowed in almost equal numbers.

Half of the total group were referred from the medical or surgical wards or the emergency room of St. Louis City Hospital, one quarter were referred from the inpatient services of Malcolm Bliss Psychiatric Hospital, and the other quarter were referred by self, by family or friends, or by outside professional persons (social workers, private physicians, etc.) in almost equal numbers. About one-third had a history of previous admission to a psychiatric hospital. Half were seen originally in the clinic by a first or second year psychiatric resident, one quarter were seen by a medical intern rotating through the psychiatric services, and the quarter by a staff psychiatrist or a social worker (in roughly equal numbers).

Patients were seen for a mean of 3.5 interviews, but about one-third were seen only one time, and for the remainder (who were seen for more than one interview) the mean number of interviews was 5.2. About three-fifths were under our care for less than a month. Two-thirds were seen by one therapist only, one-sixth were seen by two therapists (in two or more different interviews, of course), and one-sixth were seen by three or more therapists. Final diagnosis included that of psychosis for about one quarter, psychoneurosis for another quarter, and organic brain disorder, personality disorder, and other diagnosis or undiagnosed for a sixth each.

Procedure and Results

Case records of the total group, dichotomized as "completed" or "failed," were then analyzed for differences in each factor category. Statistically significant differences (at or beyond the one per cent level of confidence) were found in the following categories only: sex, marital status, source of referral, and diagnosis—44% of the women failed, 30% of the men failed; 32 to 40% in all marital categories except "single" failed, 25% of the single patients failed; 36 to 49% of the patients in all other referral categories against 17% of the patients referred by an outside professional person failed; 34 to 46% of the patients in all other diagnostic categories against 20% of the patients diagnosed "organic brain disorder" failed. No statistically significant differences were found for the following categories: age, religion, place of birth or parents' place of birth, occupation, history of previous admission to a psychiatric hospital, status of first professional interviewer, duration of therapy, number of interviews, or number of changes of therapist.

In all categories where results might be influenced by the relatively large number of patients seen only once, additional computations taking this factor into account were made (e.g., tabulating differences only for patients seen two or more times). However, no other significant differences were noted after additional computations had been made.

Comment

It is our impression that those differences noted to be statistically significant in relationship to failure to return are of some importance in predicting rates of failure for large patient groups (in respect to the specific variables noted). For example, one might predict that men, single persons, patients referred from outside professional sources, and those diagnosed as suffering from organic brain disorders, would be more likely to complete their course of treatment. This type of cross-sectional study, however, does not yield any insight into the dynamics of "breaking therapy," nor does it allow successful prediction of behavior in any single individual. Therefore, our conclusion is that the reasons why patients fail to return to psychiatric clinics must be looked for through deeper investigation of the personality patterns, psychodynamics, and expectations of both the patient and the therapist, and of their mutual interaction.

Authors' Note: This paper is one of a series reporting a larger study of mental health problems of older persons in progress at Malcolm Bliss Psychiatric Clinic, St. Louis, Missouri. It is supported by Research Grant M-1252 from the National Institute of Mental Health, U. S. Public Health Service.

Applicability of Sustained-Release Psychopharmacologic Agents to Psychiatric Treatment

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Since their advent in 1954, phenothiazine derivatives have become the foremost group of drugs used in the treatment of mental illness. These compounds appear to produce their effects through action upon the subcortical areas of the brain such as the reticular substance of the brain stem and mid-brain. It is also believed that the drugs suppress several active centers of the autonomic nervous system. Two of these drugs, chlorpromazine (Thorazine) and prochlorperazine (Compazine), have recently become available in a dosage form which is designed to reduce the number of daily doses. This method of preparing drugs, a sustained-release capsule, has been successfully applied to other medications but has not before been applied to psychopharmacologic agents.

In sustained-release capsule (Spansule) form, chlorpromazine or prochlorperazine, is prepared as hundreds of minute pellets that are either uncoated, or coated with varying thicknesses of a digestible material. Following ingestion, the uncoated pellets release an immediate dose of medication, while the remaining pellets, because of their special coatings, release small amounts of medication continuously during the subsequent seven or eight hours, and thereby extend psychopharmacologic effects for twelve hours.

Since the efficacy of chlorpromazine and prochlorperazine has been adequately described and summarized,[1,2] the emphasis of this evaluation was placed on the applicability and efficiency of the sustained-release dosage form of these drugs in the treatment of hospitalized and non-hospitalized psychiatric patients. The specific aims of the evaluation were to determine, if possible, 1) whether decreased daily administration of the drugs effectively supplanted their administration on a more frequent schedule; 2) whether equivalent total daily doses of the drugs administered in this form produced equivalent effects; 3) whether administration of the drugs only once a day had any adverse psychological effects on patients; 4) whether the incidence of side effects differed when the drugs were administered in sustained-release form; and finally, 5) whether the sustained-release dosage form had any advantages over conventional dosage forms in the operation of hospital wards and private practice. Adequate records on which to compare and judge the advantages or disadvantages of the sustained-release dosage form were available since most of the patients had received one or the other of these drugs in tablet form.

Material and Method

Hospitalized Patients

Although significantly larger groups of patients have received chlorpromazine or prochlorperazine in sustained-release form, this report is restricted to observations that were made in a group of 52 psychotic patients (50 schizophrenics, 2 manic-depressives, manic type) who received this form of the drug for six months or longer. All the patients were women residents of an unlocked, non-restraint disturbed ward, and were picked at random from the total ward population. The non-restraint method of managing disturbed patients has recently been reported by several of us.[3] The patients ranged in age from 22 to 79 years; they had been mentally ill for periods ranging from a few months to 29 years. Patients who were receiving concomitant therapy that had to be administered on a multidosage regimen were excluded from the evaluation. All the patients had received chlorpromazine or prochlorperazine in tablet form, and had shown considerable improvement when the present evaluation was instituted.

Twenty patients whose previous daily dose of chlorpromazine averaged 450 mg. (150 mg.-1200 mg.) were placed on equivalent doses of the drug in sustained-release dosage form. Whereas previous doses were ad-

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ministered four times a day, the present total daily dose was administered all at once in sustained-release capsules containing 75, 150, 200, or 300 mg. of chlorpromazine. Thirty-two patients whose previous daily dose of prochlorperazine averaged 125 mg. (30 mg.-300 mg.) were also placed on equivalent doses of the drug in sustained-release form. All doses were administered once a day, usually in the morning, and were administered in sustained-release capsules 10, 15 or 30 mgs. of prochlorperazine.

Non-Hospitalized Patients

Forty patients were selected for the evaluation, and received only one of the drugs, chlorpromazine, in sustained-release form. Twelve patients either discontinued medication, transferred to other physicians, or were committed to institutions so that adequate follow-up data could not be obtained. Observations made during the course of one year on the remaining 28 patients are included in this report. Specific diagnoses of the patients are shown in Table 1. The patients ranged in age from 14 to 68 years; they had been mentally ill for periods varying from 3 months to 5 years. All the patients had received chlorpromazine in tablet form previously, either from the referring physician, or before treatment with sustained-release capsules. During the present course of therapy, none of the patients received electroconvulsive treatment. Psychotherapy was given concomitantly to all suitable patients.

Total initial doses, administered once or twice a day, of sustained-release chlorpromazine varied between 75 mg. and 400 mg., and averaged 225 mg. As the acute phase of the patients' illness was controlled, they were placed on maintenance doses of the drug. Maintenance doses were administered generally only once a day, according to the individual needs of the patient. In some patients small sustained-release doses were given in the morning and larger ones at night. In this way the patients remained alert during the day, and still received higher total doses without experiencing increased side effects. Results of therapy were based on periodic evaluations by the psychiatrist, and on consultations with the patients or their relatives. The patients were also questioned or examined at this time for signs or symptoms indicative of side effects or toxic manifestations that may have been related to the administration of the drug.

Results

Hospitalized Patients

Although it was not the chief concern of this evaluation, some attempt was made to determine psychotherapeutic results brought about by the administration of the drugs. Arriving at specific results was difficult because all the patients had received the drugs in conventional form previously, and because becoming residents of the unlocked, non-restraint ward seemed to benefit many of them. However, certain criteria (issuance or revocation of ground privileges, custodial leaves, and discharges from the hospital), for which accurate records were available, were used as some indication of a change toward or continuation of beneficial psychotherapeutic effects. When the evaluation was instituted, six patients were allowed ground privileges or custodial leaves. At the conclusion of the evaluation, 26 patients had been granted these privileges. During the course of the evaluation, eight patients were denied these liberties for short periods, but had regained them by the time the evaluation was completed. During the evaluation three patients who had been receiving chlorpromazine and six who had been receiving prochlorperazine were released from the hospital. Many other patients could have been discharged also but were not because they had no families or relatives to care for them. The patients who were released from the hospital continued to receive the respective drug in sustained-release form, and returned to the out-patient clinic for further treatment, medication, and evaluation.

Replacing the multi-dose tablets with equivalent doses of these drugs in sustained-release form produced equally satisfactory results in the patients' behavior. In general, patients remained less abusive, destructive, assaultive, or noisy, and were more cooperative and easier to manage. As one would expect, slight differences were observed when the drugs were administered in one form or the other, but they were usually so slight that they did not affect the routine management of individual patients or the wards. In

all but a few patients, equivalent doses of chlorpromazine or prochlorperazine given once a day afforded psychotherapeutic results that were substantially the same as those that were observed when the drugs were administered on a more frequent basis. The various dosage strengths of the sustained-release capsules permitted adequate management of daily drug requirements regardless of the amount of the drug that had to be administered.

Administering the drugs only once a day did not produce any adverse psychological effects on the patients. Actually, the reverse was true. Many patients felt that receiving medication only once a day meant that they were "getting well," and it thereby provided a beneficial psychological effect.

The frequency of side effects during the present evaluation equaled that ordinarily experienced when chlorpromazine was given in tablet form. Excessive drowsiness and weakness, however, appeared to be less prominent with sustained-release capsules. For example, patients receiving single tablet doses above 200 mg. sometimes required rest periods or naps until the peak effect of the dose had passed. The rarity of rest periods and naps during the present evaluation may have been related to a lessened peak effect that was brought about by the slow, continuous release of the drug from the pellets over a relatively prolonged period. None of the patients developed jaundice or agranulocytosis while receiving chlorpromazine in the special form, although three patients had experienced one or other of these side effects in the past. None of the nurses or attendants developed dermatitis from handling chlorpromazine. This may have been due to chance or because the drug is contained in a hard gelatin capsule.

As has been observed by other investigators, side effects accompanying the use of prochlorperazine are generally less prominent than those associated with other phenothiazines. The only troublesome side effect observed in this evaluation was the appearance of extrapyramidal symptoms in patients receiving daily doses of prochlorperazine greater than 75 mg. These symptoms were always reversible by either reducing the total daily dose, or by the simultaneous administration of anti-Parkinsonism drugs. The incidence of extrapyramidal symptoms was not affected by administering the drug in sustained-release form. Whether these symptoms actually represent side effects of the drug has been questioned by Goldman,[2] who prefers to consider them as an index of therapeutic effect.

Since most nurses look upon dispensing medication as a mechanical, tedious, and often traumatic experience, the once-a-day administration of chlorpromazine and prochlorperazine in sustained-release form provided a welcomed respite. Nursing personnel were able, as a result, to devote more time to other forms of psychotherapy such as occupational and recreational programs.

Non-Hospitalized Patients

Results, based on symptomatic and objective improvement, for this group of patients are shown in Table 1. Ten patients (36%) had excellent results, eight patients (28%) had good results, six patients (21%) had fair results, and four patients (15%) obtained poor results. The most significant re-

TABLE 1

Psychotherapeutic Results Obtained With Chlorpromazine in Sustained-Release Form

Diagnosis	No. of Patients	RESULTS Excellent	Good	Fair	Poor
PSYCHOTIC DISORDERS					
Schizophrenia	10	4	3	2	1
Involutional Reaction	3	1	1	1	0
Manic Depressive	2	2	0	0	0
Post-partum Reaction	1	1	0	0	0
Unspecified	7	2	2	2	1
PSYCHONEUROTIC DISORDERS					
Psychophysiologic Disorders	2	0	0	0	2
Mental Defectives	2	0	2	0	0
Chronic Alcoholism	1	0	0	1	0
TOTALS	28	10 (36%)	8 (28%)	6 (21%)	4 (15%)

sults were obtained in the treatment of schizophrenia, where 70% of the patients showed excellent or good results. The poorest responses were observed in the patients with psychophysiologic disorders.

The conclusions regarding the applicability of the sustained-release form of chlorpromazine in the treatment of hospitalized patients also apply, with few exceptions, to the non-hospitalized patients. There was little or no difference in psychotherapeutic effects when equivalent doses of the drug were given as a single sustained-release dose or in two divided doses. None of the patients experienced serious side effects. The decrease in excessive drowsiness and weakness that was observed when chlorpromazine was administered in sustained-release form to hospitalized patients was also observed in the non-hospitalized patients, and had a greater significance since many of the latter patients continued to work during their illness. Being less drowsy permitted them to retain near normal efficiency in their jobs or contacts with others. Taking a single sustained-release dose of medication in the morning proved most significant in these patients since it permitted them to avoid the mid-day or afternoon doses.

Comment

The similarity of patient response to the administration of chlorpromazine and prochlorperazine in sustained-release capsule form that was observed during the present evaluation serves to point up the broad applicability and utility of this method of administering medication. In private, non-hospitalized psychiatric patients where the utmost care must be taken to avoid situations that might suddenly precipitate a relapse, being able to take the entire day's medication at home was an important advantage. Moreover, since the appearance of side effects that accompany the use of drugs can often lead to complete discontinuance of medication by patients, the reduced incidence of side effects that was evidenced when chlorpromazine was administered in sustained-release form was indeed helpful. Administering the drugs in sustained-release form to hospitalized patients also had its benefits. The reduced incidence of side effects permitted patients to spend more time participating in other psychotherapeutic measures such as recreational and occupational therapy. The chief benefit to be gained from administering the drugs in sustained-release form to hospitalized patients, however, concerned the amount of time that was saved in the actual administration of medication. In our particular setting medication is administered with meals and at bedtime, and the time saved was somewhat less than might have occurred if the administration of medication had taken place on the wards. However, the amount of time that was saved by not having to administer medication before the patients retired was enough to evoke favorable comment from the nursing personnel. Obviously if this saving in time is translated to other areas of therapy, an immeasurable amount of benefit can be derived by the patient and by the administrative staff.

Summary

Sustained-release capsules containing chlorpromazine or prochlorperazine were administered to 80 psychiatric patients for periods up to one year; 52 patients were hospitalized psychotics and the remainder were private, non-hospitalized patients with a variety of psychiatric conditions. Total daily doses of chlorpromazine ranged from 150 mg. to 1200 mg., while daily doses of prochlorperazine were approximately one-third or one-quarter that of chlorpromazine. Doses were administered once or twice a day. Psychotherapeutic results, though more dramatic in non-hospitalized patients, were observed in both groups. Considering the applicability of the sustained-release dosage form of these drugs to the treatment of psychiatric patients, it was found that giving the drug once or twice a day 1) supplanted the administration of equivalent doses of the drugs on a more frequent schedule; 2) produced a beneficial psychological effect on some patients; 3) reduced the incidence of certain side effects; 4) permitted a greater latitude of safety in non-hospitalized patients; and 5) reduced the workload of nursing personnel.

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Symposium*
on Major Variations and Modifications of Conventional Electric Shock Therapy

Introduction

JOHN D. MORIARTY, M.D.

As two decades have elapsed since the first use of electrically induced convulsions for therapeutic purposes by Cerletti and Bini, of Rome, it behooves us to assess the major modifications and the modern variations of the original "electric shock" treatment, which followed a few years after the epochal discovery by Meduna about 1935 of the therapeutic value of convulsive therapy in general. As his contribution to the group of monographs published in the United States under the title "The Great Physiodynamic Therapies in Psychiatry," Cerletti gives a very interesting account of the theory and research which led to his great therapeutic innovation.

It is his theory that it is the effects of a strenuous epileptiform seizure which produce the therapeutic results. He puts particular emphasis on the production by the seizure of humoral substances which he calls "acro-agonines." Despite the brilliance of his original contribution, few workers in the field, in this country at least, put much stock in the validity of his theory. In fact, there is much evidence to indicate that the theory itself blocks further research and development in the field.

As I understand it, Impastato and Almansi in New York and Gonda in Chicago were the first to introduce electric shock treatment in this country, in late 1939. Also about this time Wilcox and Friedman, assisted by Reiter, had been doing experimental work with animals utilizing various modifications of the conventional AC house current. About April 1940 they began treatment of human patients using lower energy unidirectional currents.

In the past 18 years in this country two rather distinct schools of thought have emerged in terms of the place of EST and its applications in our therapeutic armamentarium in psychiatry, and I am now referring to physicians who have had experience with EST and who use this treatment modality in practice, not to certain psychoanalysts who have little or no experience with it and/or who avoid it on purely theoretical grounds.

The first school of thought, perhaps exemplified by Kalinowski, seems to hold to the original Cerletti concept. These psychiatrists seem to say that the important therapeutic mechanism is the production of a grand mal seizure, and the more strenuous the better (within reasonable limitations), unmodified by drugs, utilizing large electrodes applied in the "standard" position to the fronto-temporal areas bilaterally, with the convulsion being produced as simply as possible by a large dose of AC current administered for perhaps 0.4 or 0.5 second. As Kalinowski has pointed out, the electrically induced grand mal fit is surprisingly well tolerated by persons of all age groups, including many who have serious somatic disease. This school of thought seems to feel that any modification of the seizure by drugs introduces more hazards than it prevents. They also seem to believe that any attempt at modifying the therapeutic effect by different electrode placements or by nonconvulsive stimulation is without merit.

Without entering into the controversy about the value of drugs such as thiopental for anesthesia and succinylcholine for muscle relaxation, it may be said that as far as

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the therapeutic benefits are concerned conventional ECT is generally considered to be about equally effective for endogenous depression and some schizo-affective psychoses as convulsive therapy induced by the newer modifications. Right there it seems to me that the parallel ends.

Originating with the work of Wilcox and Friedman, the second school operates on the assumption that the brain may be stimulated in a differential manner by utilization of longer stimulation with low energy currents, particularly unidirectional pulsating current, by different electrode placements to produce different effects, by selective use of non-convulsive stimulation, either alone or in combination with convulsive stimulation, and in general by the use of flexible technics with continual attention to neurophysiologic mechanisms.

Five years' experience with the epinephrine-mecholyl test (Funkenstein test) has convinced me that differential brain stimulation by adequate flexibility of technic is quite possible, and furthermore that fitting the technic to the patient rather than subjecting all patients to the same technic will produce better overall therapeutic results. Perhaps in some of our discussions in the past we have placed too much emphasis on the type of current employed, but it does seem evident that the conventional AC current does not permit as much flexibility or adaptability to the individual case. Certainly the dosage of current is not so important, except possibly in the production of side effects like memory disturbance, as is the question whether the current triggers a convulsive seizure or not. In other words convulsive stimulation and non-convulsive stimulation in many ways have the opposite effect and bear a reciprocal relationship to each other, whatever the dose of current employed.

Now to give a brief resume of the correlations of the epinephrine-mecholyl test (Funkenstein test) with various forms of EST:

(1) Favorable cases for ECT, conventional or otherwise, are those who show a sustained hypotensive reaction to the intramuscular injection of 10 mg. of mecholyl during the 25 minutes of that portion of the test. In addition anxiety precipitated by mecholyl is generally a favorable sign for ECT.

(2) Patients who show a normal compensation to the hypotensive effect of mecholyl or an overcompensation with a rebound of the systolic blood pressure above baseline are generally unfavorable for conventional ECT. However, combined convulsive and non-convulsive therapy, particularly with a different placement of the electrodes from the conventional bifronto-temporal position, may produce better results in these patients. When the patient shows anxiety precipitated by epinephrine (.025 mg. I-V) the response to conventional ECT is poor, but this can be overcome by non-convulsive after-stimulation.

(3) When the patient shows an unfavorable grouping on the Funkenstein test, particularly an overcompensation with a rebound of the blood pressure above baseline, conventional ECT may make the patient worse, such as by sharply increasing the anxiety level even to the point of a panic reaction. These patients may respond very satisfactorily to such measures as non-convulsive electric stimulation, to carbon dioxide coma therapy, to various tranquilizing drugs, to insulin sub-coma therapy, and other such physiodynamic therapies that have the opposite effect on the central autonomic regulatory centers in the posterior hypothalamus from ECT.

With this introduction I now plan to have each of the panel members give a short formal presentation of a special technic in electrical stimulation.

It should be emphasized that conventional ECT is still very valuable for such illnesses as endogenous depressions; we are trying to present technic for dealing with otherwise unsuitable or generally unfavorable cases.

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Non-Convulsive Electro-Cerebral Stimulative Therapy

PAUL H. WILCOX, M.D.

The selection of patients suitable for non-convulsive electro-cerebral stimulative therapy is the first consideration. The technical steps of the procedure are not difficult, but the appropriate provocative psychotherapy needs to be understood. The reactions of the patient to this combined physical and psychological treatment give important clues as to whether this is the treatment of choice for this patient. It should be understood that this technic often is only a phase of the treatment program for a given patient because after adequate facilitation has been obtained, it may be desirable to continue the psychotherapy either alone or combined with carbon dioxide therapy.[1,2,7]

Selection of Patients

In private practice I find that well over half of the patients who come to me are suitable for non-convulsive electro-cerebral stimulative therapy which I call low ESnc. Certain criteria are helpful so that hazards on the one hand and excessive therapy time on the other hand can be avoided. First, this modality is not an emergency treatment. If the patient is acutely disturbed, either with suicidal depression, agitation or confusion, emergency electro-convulsive treatment is usually indicated and adequate supervision, probably hospitalization, is imperative. Thus, the first criteria for low ESnc in the office are that the patient should be reasonably accessible and should desire help. The next question is whether the emotional problem is sufficiently deep-seated to warrant more than psychotherapy alone or combined carbon dioxide therapy and psychotherapy. The suitable patient can be more precisely defined as one who is predominantly neurotic but who has one or more of these symptoms:[4] marked fear and anxiety, nightmares, obsessive preoccupations, marked hate and aggressive tendencies, marked irritability, feelings of depersonalization, feelings of unreality, clinical confusion, ideas of reference, delusional trends.

Any of these symptoms may be of psychotic proportions and if they are present in a patient who is poorly accessible and who is rejecting the idea of treatment, the decision should be for hospitalization and more intensive therapy.

To summarize: the appropriate patient for low ESnc is one who is predominantly neurotic, but who has an admixture of symptoms which have potentially psychotic implications other than endogenous depression. Where depression of despair degree, agitation and sleeplessness are the predominant symptoms, ECT is the treatment of choice.[5] If these symptoms of endogenous depression increase during a series of low ESnc treatment, it should be changed to ECT.

Procedure

No special preparation of the patient is required except that he should avoid a heavy meal immediately before the treatment and should empty his bladder before treatment. However, arrangements need to be made for the care of the patient after the treatment. He should not drive a car for at least two hours after treatment and the doctor should approve him before he should drive even then. The preferred arrangement is for a suitable person to take the patient home at the end of the hour or when the doctor decides he is ready to leave.

After suitable examination, the patient is put to sleep with I.V. Pentothal, given slowly. When the patient is no longer able to count out loud, the depth of the anesthesia is tested by giving 0.5 ma. stimulation and if he shows defensive reactions another 0.05 Gm (1 cc) of Pentothal is given. These increments are given until the defensive reactions are absent even when the stimulus is increased to 2 ma. The electrodes are in the bi-parieto-mastoid position.

The patient is now ready for the treatment itself. I use the Reiter Electrostimulator, which gives unidirectional spiked pulses of irregular amplitude. My present procedure is to use #5 current on this machine with maximum modulation to start with. I set the machine for 10 ma. of average current as shown on the meter with the

sampler switch at "sample." I hold the patient's chin up so that the teeth are together thus preventing his biting his tongue. Then I turn the sampler switch to "treat." My usual sequence is as follows: 10 ma. for 0.05 minutes, 5 ma. for 0.35 minutes, 3 ma. for 0.60 minutes at low modulation, 0.5 ma. until the first signs of returning consciousness occur, most frequently swallowing.

The ideal amount of Pentothal is that amount which keeps the patient asleep for from 1.25 to 1.5 minutes after the start of stimulation. However, if the anesthesia is too light, the stimulation should be terminated sooner and if the anesthesia is too deep the stimulation should be continued until consciousness begins, even if it takes 10 or more minutes. On the next treatment the quantity of Pentothal is raised or lowered accordingly. The longer stimulation does not add to the value of the treatment. When the Pentothal is insufficient there is danger that the patient may feel the stimulation and it is difficult to terminate the stimulation at the exact desired moment. When the ideal amount is given, the termination point is easy to determine.

Reactions of the Patient

The majority of patients selected as indicated have a tendency to weep at the moment of awakening.[3] This reaction is then fostered by having the patient say provocative phrases, such as:

"I don't know what to do with my poor little self."
"I want to be comforted."
"I don't know what to do with my proud little self."
"I wish I had never been born."
"I don't really know what breaks my heart."
"I unconsciously feel doomed to be a miserable wretch."
"I want to be a little baby in your arms."
'I don't know whom I hate."
"I don't know whom I love."
"I don't know why I want to cry."

The phrases should be adapted to the responses of the patient and then reinforced to enhance the abreaction.[6] After the reaction has been fostered for awhile, the patient begins to relax and feels less weepy, usually before the end of the hour. This treatment is of little or no value if this facilitation period is not utilized psychotherapeutically.

Another pattern is for the patient to awaken with a slight euphoria and then to suffer a return of depression by the end of the hour. This is a critical indication of the presence of endogenous depression and if the depression is profound, the patient should be given an ECT that same day, otherwise suicidal hazard is increased.

A third pattern is for the patient to remain or slip back into a deep stupor with constricted pupils. Attempts to arouse the patient are often fruitless, but after a varying period of time the patient lightens and then can be aroused. This reaction seems to be therapeutically advantageous in those patients and in those sessions when it occurs. It seems to be a fulfillment of some need for the patient to retreat temporarily into deep stupor as an escape.

Various trance states are occasionally induced which usually subside before the end of the hour. However, if the trance is prolonged, there arises a problem of management and sometimes CO_2 coma is useful in terminating the trance.

Other reactions may be: anger abreaction, the appearance of conversion symptoms or bland or neutral reactions.

In favorable cases 10 to 20 of these low ESnc's result in a marked diminution of the presenting symptoms.

Theory

I know of no theory which adequately explains all these phenomena. However, I think of the unconscious mind as in layers. CO_2 treatments seem to reach the most superficial layer. The low ESnc's seem to get at a somewhat deeper layer, mainly emotions which are psychodynamically reactive but not symbolically organized as in the dream layer. ECT's seem to affect a still deeper layer which is beyond the reach of psychotherapy. There are few who really claim that they can deal with a deep endogenous depression with psychotherapy alone. The patients in whom the problems are predominantly in the upper layers of the unconscious mind can be handled with psychotherapy alone but I believe that, with the aid of low ESnc and of CO_2 as facilitators, the total therapeutic hours for a given amount of improvement can be considerably reduced.

Summary

Non-convulsive electro-cerebral stimulation therapy using light Pentothal anesthesia and provocative psychotherapy has been found to be a valuable facilitator in the office treatment of the majority of predominantly neurotic patients who have an admixture of schizoid symptoms. Patients with endogenous depression are made worse by low ESnc and should be treated with ECT instead.

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Evaluation of Therapeutic Results of Electric Stimulation of the Diencephalon

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Over the 20 years since the introduction of ECT numerous modifications have developed and the attempts at variation can be classified according to the purpose in the investigator's mind:

1. Some were motivated by the desire to reduce hazards and side effects. Examples of efforts in this direction are use of muscle relaxant drugs or non-convulsive technics.[1,2,3]

2. Others were guided by the desire to improve the psychiatric results of electrotherapy. This led to modifications such as electric coma, unipolar technics, or multiple electrodes.[4,5,6,7]

This paper deals with studies directed at improving psychiatric results. By such an approach, hazards and side-effects are also minimized. Over the last 2½ years the staff at the Arizona State Hospital has developed a new and wider concept of electrotherapy. This concept is based on experience with nonconvulsive stimulation of the diencephalon first reported July 1957.[8]

There are indications that types of electrotherapy other than standard ECT may consistently produce good results in a variety of mental disorders when standard methods have failed. Localized electric stimulation might offer an improvement over standard ECT technics, and for this reason over the years many attempts have been made to use such a modality.[9,10] However, these attempts were frequently unsuccessful as long as electrodes were placed on the outside of the skull, or as long as currents of an intensity sufficient to influence the entire brain were used. The idea emerged that if we could concentrate the electrical field in the area which we would like to influence most, then we might not need strong, convulsion-producing currents to obtain results.

In selecting the brain area which we wanted to influence we were guided by the following criteria:

There is sufficient experimental evidence that hypothalamic areas, probably including the reticular activating system, are involved in the control of emotions. There is also little doubt that excessive or impaired emotional reactions are a factor in most mental disorders, and we therefore presume the involvement of the diencephalon in many mental diseases. On the basis of this fact, the aim of our technic is to find a way of localizing the therapy in diencephalic areas.

From Arizona's State Hospital, Phoenix, Ariz.

Whenever we subject the brain to electric currents by placing the electrodes on the outside of the skull, the most concentrated electrical field is created in the cortex, no matter what method we use. This observation led to the development of special nasopharyngeal electrodes which could be brought closer to the diencephalon. We are aware that earlier attempts had been made years ago to use naso-pharyngeal electrodes.[11] However, in the fall of 1955 we started using special diencephalic electrodes and minimal currents and immediately found that certain disorders responded favorably.

Methods

A detailed discussion of the equipment and methods used may be found in the original report.[8] Essentially the method is as follows:

Two kinds of electrodes are used; one is a small naso-pharyngeal electrode introduced through the nares and reaching to an area near the body of the sphenoid bone close to the diencephalon. The other electrode is a scalp electrode placed on the vertex of the skull. Two electrodes connected by a wire may be used to increase the area of contact with the scalp. The Reiter Stimulator RC-47C is used. The procedure is carried out with 5 percent Sodium Pentothal anesthesia and a current of varying intensity applied until the patient shows signs of awakening when there frequently occurs an emotional reaction such as crying, and during this time psychotherapy may be utilized.

The procedure in this arrangement we call "Non-convulsive Diencephalic Stimulation," (D) in contrast to "Cortical Stimulation," (C) which occurs when electrodes are placed on the outside of the calvarium. In treating approximately 300 cases we believe that the results obtained justify the use of either one or a combination of both methods.

Cortical stimulation with high currents (standard ECT) seems most effective in depressive states, particularly in cases of true or "endogenous" depressions. It is also effective in catatonia.

Diencephalic stimulation with somewhat higher currents (up to 15 ma.) often leading to atypical seizures, seems most effective in all paranoid conditions including paranoid schizophrenics and involutional reactions with paranoid features.

Diencephalic stimulation even with high currents and ensuing seizures never produces memory impairment nor confusion and has no visible effects on the normal EEG.

A combination of cortical and diencephalic stimulation can be administered by using both methods alternately within a series of treatments. Change in the patient's presenting symptoms serves as a guide. Combined C and D can also be carried out during one particular treatment by administering a standard ECT and using the period of unconsciousness following the convulsion for diencephalic stimulation of a few minutes' duration. The effects of combined C and D seem to resemble the effects of electric coma, which has been abandoned. C and D have produced favorable results in chronic schizophrenic patients and psychotic depressions not responsive to standard ECT.

To complete this report it should also be mentioned that we have used diencephalic stimulation without Sodium Pentothal anesthesia, using Impastato's petit mal technic,[12] for the induction anesthesia. However, the period of unconsciousness produced by the petit mal technic is not long enough to permit the diencephalic stimulation with small currents, and it is therefore not recommended in anxiety states.

Results

Diencephalic and combined cortical and diencephalic stimulation have been used for almost three years on the female services of the Arizona State Hospital. An attempt to study the effectiveness of the selected electrotherapeutic procedures has been made on approximately 300 patients treated by various methods since January 1956.

We have divided these patients into two groups. Group I comprised 189 female patients treated during the period from January 1956 through July, 1957. (18 months.) This group consisted of all the women patients admitted to the Arizona State Hospital who were treated with electrotherapy. Naturally a large part of these patients were first admissions with acute illnesses, so that the prognosis in general was relatively fa-

TABLE I

Results of Diencephalic Stimulation on 280 Patients

Group I includes patients treated over a period of 18 months ending July 1, 1957. Group II is a study of current cases resistive to previous treatment.

GROUP I							GROUP II						
Total	Compl. Dis.	Cond. Dis.	CD Fet'd.	In	Out	DIAGNOSIS	Total	Compl. Dis.	Cond. Dis.	CD Fet'd.	In	Out	
29	17	10	1	4	25	Schiz. R. Acute undiff.	5	0	4	1	1	4	
23	9	11	6	5	18	Chron. undiff.	14	1	7	2	6	8	
42	24	16	5	2	40	95% Paranoid	31	0	18	4	13	18	58%
12	9	2	2	0	12	Catatonic	14	0	5	1	9	5	
0	0	0	0	0	0	Hebephrenic	6	0	1 1+El.	0	4	2	
1	1	0	0	0	1	Simple	1	0	0	0	1	0	
8	6	1	1	1	7	Schizo-affect.	0	0	0	0	0	0	
5	5	0	0	0	5	Psychotic Depress. R.	1	0	1	0	0	1	
5	3	1	1	0	5	Manic-Depr. Depressed	2	0	0	0	2	0	
14	8	2	4	0	14	Manic	0	0	0	0	0	0	
2	2	0	0	0	2	Mixed	0	0	0	0	0	0	
11	7	0	2	2	9	Involutional Psych. R.	10	0	6	4	3	7	
17	14	2	1	1	16	Neurosis, Anxiety	3	0	2	0	1	2	
10	7	22	1	0	10	Depressed	0	0	0	0	0	0	
2	1	1	0	0	2	Compulsive	0	0	0	0	0	0	
7	4	2	2	1	6	Personality Disorders	0	0	0	0	0	0	
0	0	0	0	0	0	C.B.S. with Psychotic R.	4	1	0	0	1	3	
189	116	50	26	16	173	TOTALS	91	2	44+1	12	41	50	
	61%	26%			92%							55%	

vorable. Also included in this group were 18 patients admitted since July 1, 1957. They were first admissions and most of them not previously treated. Results in this group are significant from a long-term point of view because considerable time has elapsed since treatment. It is encouraging to see that out of the 189 cases, 92%, or 173, are no longer in the hospital; 116, or 61%, are on complete discharge, which means that they have been out of the hospital for over a year without returning, and 50 have left for varying periods of time and are still on conditional discharge. Of the 189 treated patients only 16 (8%) are still in the hospital.

Group II comprises 91 female patients treated during the period beginning July 1, 1957 and ending March 15, 1958. The patients are considered chronic because of the long duration of their illness and because they had not responded to previous therapies. Some had been hospitalized for many years, a few ten years and more. This is obviously a group with poor prognosis and, as is to be expected, the results are by far less favorable. Of the total number, 41 patients are still in the hospital and 50 have left. However, it is reasonable to assume that with standard treatment technics most of these 50 patients would still be in the hospital.

Comments

In studying the accompanying chart it is apparent that the best results with diencephalic therapy were obtained in paranoid schizophrenics. Group I contains 42 patients diagnosed as such, out of which 40 are out of the hospital; 24 are on complete discharge and 16 on conditional discharge. Only two out of the 42, or 5%, are still hospitalized. Even in Group II the paranoid schizophrenics fare better than other diagnostic categories. Out of a total of 31 patients, 18 are on conditional discharge and 13 still hospitalized. These 13 include 4 patients who have returned from conditional discharge.

Most of the results as gathered from the tabulation are in keeping with general experience regarding the prognoses. For in-

stance, in catatonic schizophrenia Group I includes 12 patients, all of whom are out of the hospital and 9 are on complete discharge. On the other hand, catatonics who did not respond initially to other types of therapy and have become chronic, show poor treatment results as seen in Group II, where of 14 patients treated, 9 are still in the hospital.

Good results have also been obtained in manic patients. Group I includes 14 patients all of whom have left the hospital, and 8 are on complete discharge.

The technic has proved useful in various types of neuroses, particularly in cases with marked anxiety or depression. The treatment was also given to a small number of patients with personality disorders. Group I includes patients diagnosed as such, mostly passive-aggressive personality, six of whom are out of the hospital, including four who are on complete discharge.

It is realized that this statistical material may be inadequate because of the complexity of the problem, the impossibility of comparing one individual with another, the possibility of spontaneous remissions and the affects of concomitant therapies. However, the results seem to indicate that we are correct in assuming that standard ECT need not be the only type of electrotherapy, and that certain cases do better with other modifications.

Summary

The aim of this study was to evaluate selective electric stimulation of different brain areas. Choice of cortical or diencephalic areas had been made possible by the use of special electrodes (naso-pharyngeal electrodes) which can be brought close to the center of the base of the skull. This method (diencephalic stimulation) with currents of varying intensities, has been practiced on several hundred cases of various diagnostic categories and the results tabulated.

It was found that the effects of diencephalic stimulation differ in a characteristic and repeatable manner from the effects of ECT (cortical stimulation).

It was noted that in cases where anxiety and excitement were predominant symptoms, the diencephalic approach produced better results. Neurotic anxiety states as well as manic psychoses usually respond in one to five treatments with minimal currents (one to 3 ma.) with the Reiter machine.

Paranoid conditions with delusions and hallucinations seemed to respond better to a longer series (8 to 15 treatments) with higher currents (up to 15 milliamperes). The diencephalic approach never produced confusion nor memory loss and the EEG remained normal.

Depressive states clear up better with conventional electrode placement on the outside of the skull and higher currents (cortical approach).

Some schizophrenic reactions, particularly chronic conditions previously unimproved, have shown remarkable improvement or complete remission with a combination of cortical and diencephalic approach.

A tabulation of treatment results on 280 patients in Arizona State Hospital is given.

It is concluded that therapeutic results of conventional ECT can be improved by the selection of treatment technics which vary in local electrode placement, as well as in intensity and quality of current used.

Acknowledgment: The development, practice and evaluation of selective electrotherapy has had the continuous interest and support of Dr. Samuel Wick, Director, Arizona State Hospital, whose assistance and suggestions are greatly appreciated.

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Peripheral Electrical Stimulation

CHARLES H. JONES, M.D., and JAMES G. SHANKLIN, M.D.

Peripheral electrical stimulation can be correctly regarded as a direct offshoot from nonconvulsive electroshock therapy. The feasibility of the method was determined by the authors during a discussion at the A.P.A. meeting in St. Louis in 1954. Both of us were in the custom of using convulsive electroshock and nonconvulsive electroshock specifically following Gellhorn's[1] concept of central autonomic imbalance in form of hyporeactivity or hyperactivity as demonstrated by the Funkenstein[2] test. Likewise, we had had some experience with nonconvulsive electroshock in treating barbiturate poisoning as advocated by Robie.[3] In St. Louis we discussed the experiments which were under way at that time at the University of Oregon Medical School by Blachly and Brookhart[4] in nonconvulsive electroshock with barbiturate-induced coma in dogs.

Dr. Blachly was then a junior medical student and a fellow in physiology who had seen one of us treat patients in barbiturate coma at the Holiday Park Hospital in Portland. He and Dr. John Brookhart, Professor of Physiology, became somewhat skeptical of the popular theory that nonconvulsive electroshock produced an analeptic action by transcerebral mechanisms. Thereupon they subjected some fifty-odd dogs to a variety of experiments using kymographic tracings of respiration. It was shown that in barbiturate coma (1) nonconvulsive electroshock applied to the cranium did augment respiratory minute volume and produce arousal, (2) the most effective placement on a dog's head was the snout, (3) clipping sensory nerves abolished the analeptic effect of the cranially applied current, (4) a similar but more profound analeptic effect was obtained upon stimulation of the hind legs.

We discussed this work in the light of our clinical experiences with electroshock and in light of a paper presented at the St. Louis meeting by Hebb,[5] who reported on the production of hallucinatory states in medical students by a method of sensory deprivation over a period of many hours. In short, we speculated that perhaps the clinical results of nonconvulsive electroshock were due to stimulation of peripheral nervous pathways of the head and transmission via the reticular activating system and that perhaps they could be duplicated by stimulating other peripheral nervous pathways.

Later with Blachly, Brookhart and Dixon,[6] we devised a method of giving current peripherally from a Reiter CW-47 B or C Electrostimulator. In this method 3½x5 cm. electrodes were placed on the lower legs and a 3½x10 cm. electrode was placed over the lumbosacral region. In other respects current was given in a manner similar to that described by Alexander[7] for nonconvulsive electroshock under barbiturate anesthesia, except that we soon modified the method to give a greater amount of current more quickly and to hold it to peaks of 20 milliamps for periods of time incompatible with cranially applied nonconvulsive electroshock. In our experience the clinical results of this method are indistinguishable from that of nonconvulsive electroshock with patients showing hyperreactive Funkenstein responses. Confusion and memory loss subsequent to convulsive electroshock are seen to clear with peripheral electrical stimulation as with nonconvulsive electroshock. Likewise, this method has been found to be

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superior to nonconvulsive electroshock in the treating of barbiturate coma.

As each of us is more involved in therapy than in research, it is our feeling that the theoretical potential of this method of treatment has been more or less aborted by the advent of the tranquilizing drugs. We have continued to use convulsive electroshock for patients with hyporeactive responses on the mecholyl test and have substituted one of the various tranquilizing drugs for patients with hyperreactive responses.

Shortly after this method was tried with barbiturate anesthesia, Jones and Blachly succeeded in awakening patients from profound hypoglycemic coma to the point that some of them could leave the room and take showers and eat without any form of sugar. An average of fifteen minutes of stimulation was required in these instances. They reported in a paper in 1955[8] that such arousals are not necessarily associated with an increased blood glucose, although a modest rise is seen in some cases. This method is now used at Northern State Hospital in the form of combined treatment as well as in the termination routine on the insulin program. In this area as well as in the treatment of barbiturate coma, peripheral electrical stimulation seems to have a practical application.

We[9] have advanced the theory that in comatose states and in mental illness showing autonomic hyperreactivity and demonstrating abnormalities of perception and awareness, normal afferent input is insufficient to maintain an intensity of action in the reticular activating system which will support consciousness or undistorted perception. We suggest that peripheral electrical stimulation provides massive, intense afferent input in the form of repeated and continuing proprioceptive and nociceptive impulses which produce an arousal reaction often capable of maintaining consciousness and improved perception. Some very intriguing theoretical speculations in psychiatry and neurology can be built upon this premise and it has been disappointing to us that investigators in this country, more favorably situated as to research facilities than we, have not undertaken a further study of peripheral electrical stimulation. However, a detailed confirmation has come from behind the Iron Curtain in Czechoslovakia in the past year where Hanzlicek, Matausek and Pondelikova[10] have duplicated the work of Jones and Blachly in respect to hypoglycemic coma.

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Multipolar Electrocoma Therapy

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Multipolar electrocoma therapy has been used by the author for the past ten years. The number of treatments employed to date runs into the thousands and the number of patients into the hundreds. The technic of the treatment, as previously described in the literature, developed as an outgrowth of experimental work with unidirectional currents. The original work-up was done by Wilcox and Friedman with the considerable assistance of Reiter. Originally a standard technic for simple ECT by means of unidirectional currents indicated that stimulation over the motor area of one side (temple-vertex leads) would efficiently and safely bring about a self limited generalized clonic-tonic-clonic typical convulsive reaction. However, in some instances, both with animals and in humans there were noted many lateralizing signs such as monoplegic reactions, contralateral myoclonic, opisthotonic and Jacksonian seizures.

In this earlier work no pre-medication and no anesthesia were administered and a concentration on the so-called convulsive threshold seemed to be of prime importance. It was developed that a fairly typical range for a 40-50 second convulsive reaction could be obtained in a range of 5-10 milliamperes, and a duration range of 0.5-10 seconds. A refinement concerning the duration was necessary because prolonged duration led to painful recall of the pre-convulsive experience and the milliamperage was adjusted so that a typical convulsive reaction occurred with 20-40 milliamperes for 0.5 seconds.

It was felt all along that this concentration on merely the convulsive dose and immediate convulsive reaction was too limiting and that its therapeutic usefulness could be enlarged, particularly since previous work in chemical convulsive therapy indicated that many features arising out of camphor, metrazol, and insulin therapies were of beneficial effect with and without convulsive reactions. Thus a more prolonged or more drawn out type of cerebral tonic procedure with and without the convulsive phenomena could be devised. Previous work had already established the localizing or directional possibilities of the Reiter type stimulating current, and that localization to bring out whatever neurologic pattern seemed beneficial, was possible.

Nasopharyngeal Stimulation: According to previous experience it was possible to bring about various stages of myoclonus, leading up to decebrate rigidity with or without convulsive reactions by stimulating along a path between the nasopharynx and the mastoids or vertex of the scalp. The current traversed roughly the upper brain stem areas. The technic finally was standardized so that one pole was a nasopharyngeal lead and the other pole would be spread across the occipital or parietal areas, bilaterally. The usual dose originally was induced at approximately 20 amperes for 20-30 seconds, changing polarity 3-4 times per second until a fairly steady clonic response was maintained with stertorous respirations. At this point the treatment would be continued at a lower amperage, usually 3-5 milliamperes for arbitrarily 3-6 minutes. Much more myoclonic twitching, flushing was observed if the stimulating electrode was at the nasopharynx. To date 82 patients have been treated by this method. Patients were selected for the symptomatic relief of fairly typical severe neurasthenic syndromes with anorexia, and loss of weight with associated somatic pictures. Of these 56 patients have demonstrated and maintained improvement over a period of 10 years. More recently patients have been treated by this method with other types of symptoms including fairly typical anxiety of a disabling level, some instances of paranoid conditions and a number of mixed pictures, but chiefly those in which somatizations were prominent. In these 32 total number of patients improvement was noted in 22. However, the duration of maintained improvement is not yet long enough to establish accurate evaluation.

Frontobioccipital Stimulation: The next type of multipolar stimulation and one which was an outcome of the previous modality was described as a three lead fronto-(or eth-

moido) bioccipital localization. The procedure was essentially the same as the previous one except that one pole was placed directly over the bridge of the nose using the standard one inch electrode, the other pole was bioccipital with electrodes placed over both mastoid processes. The induction was essentially the same as with the nasopharyngeal leads except that myoclonic twitching could be maintained without as much stridor. It was possible to maintain this type of stimulation both with and without tonic-clonic convulsions for as much as 7 minutes or longer with 7½ gr. of Pentothal. It is to be pointed out that the treatment was maintained at enough amperage to just barely permit respirations. This particular modality has been used extensively and it is felt, in the experience of the writer, with considerable success in the phobic anxiety and in addiction cases, particularly those that had not responded sufficiently or had seemed to stabilize on standard ECT.

In the management of most cases the treatment was originally designed as an additional or supplementary process to ECT or other procedures. However, when the symptom picture has been predominantly of a phobic or anxiety type or when anxiety or agitation with fearfulness, arose in the course of other modalities, this particular form of treatment was substituted and maintained. At present 124 of such cases have been treated and some of them have been followed for almost 10 years, with improvement being maintained in 89.

Bi-parietal-bi-occipital Four Lead Stimulation: In this modality standard one inch electrodes were placed bilaterally over each mastoid and each parietal eminence. If the skull were too small, so that less than two inches between electrodes on each side resulted, the anterior electrodes were then moved forward closer to the temporal region so that at least two inches between electrodes appeared on each side. Each side constitutes a pole. The induction of treatment with this electrode placement was either convulsive, non-convulsive, or both, and any of these inductions were possible with relatively little skill. For convulsive stimulation the Reiter Electro-stimulator was set for convulsive levels and with a starting amperage of 15 milliamps, the polarity was changed frequently as the amperage was elevated to 20 or more milliamps until a rigid generalized tonus gradually developed and maintained after the current was turned down. If the induction was done slowly over the period of 10-20 seconds this pattern of decebration of tonic or convulsive type would last from 10-20 seconds, respiration starting instantly upon reduction of amperage.

In many instances the convulsive reaction was extremely brief and, it might be noted, if succinylcholine were used would have been overlooked completely. Following such generalized tonus the current would be turned to non-convulsive directions and treatment maintained, again at an amperage barely enough to permit respiration. Infrequently the placement of the mastoid electrodes would cause involvement of the pharyngeal cranial nerves to interfere with clear respirations. At such times the mastoid electrodes could be moved forward 1 or 2 cm. and the procedure again carried on. Using the elastic headband the entire placement of the electrodes could be moved forward 1 or 2 cm. by pulling up on the band over the forehead. Treatment could be maintained bringing about a state of intermittent myoclonic or intermittent tonic status with stertorous respirations for 3-7 minutes, the polarity being changed every 10 to 20 seconds.

This modality has also been employed for 10 years and its usefulness in the experience of the writer has been specific in cases of acute psychotic states, associated with severe behavior disturbances and also in cases of paranoid conditions. It was possible to bring about rapid improvement symptomatically with daily or even thrice daily treatments in cases of acute psychotic illness, after two or three days of such treatment. Treatments would then be tapered off and patient kept on maintenance therapy. In the past 10 years 186 cases have thus been treated with 164 showing and maintaining improvement for at least several years. In some instances this modality was also employed, supplementary to standard ECT, if agitation or excitement arose in the course of therapy.

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497 State St., Albany, N. Y.

Monopolar Electrocerebral Therapy

JOSEPH EPSTEIN, M.D.

The conventional method of inducing an electrical convulsion is by application of electrodes bifrontally or bitemporally and applying an AC current for a fraction of a second at a pre-set time, voltage and/or amperage. The purpose of a modification is always two-fold—(1) to improve therapeutic efficiency, (2) to make it less hazardous. The monopolar method of treatment was first introduced in May 1954 by the author and since then its methods and technics in its original or modified form have been in use in many clinics. A direct current machine (Reiter CW 47 or RC 47) is used. The basic hypothesis of the monopolar method of electrocerebral stimulation is that it is selective in its stimulative action and one can choose the areas of the brain where he wishes the current to penetrate without resorting to the necessity of diffuse overstimulation to obtain the same results.

To accomplish this one fixed or stationary electrode and one moveable electrode manipulated by the operator are employed. The fixed electrode is cuff shaped and applied to the right forearm. The moveable electrode is an insulated disc held by the operator and applied to the head. The direction of the current is from the fixed point of entry of the current (conducted over the arm) and most likely through the foramen magnum and medulla, to the point of application of the active electrode. It is our belief that the structures of the brain which require stimulation are situated in the sagittal and parasagittal areas nearest the midline. By applying the active monopolar electrode, therefore, to the region of the vertex the current passes in a sagittal direction from the medulla and brain stem to the vertex, and results are obtained with smaller amounts of current than would have been required if the currents were introduced empirically and diffusely to the bifrontal regions. The sagittal direction of stimulation with controlled amounts of current stimulates the various thalamic nuclei and the adjacent structures particularly the reticular activating substance. If the current is applied to the front of the vertex and to either side of the midline, the fronto-thalamic pathways are stimulated. Evidence of the deeply penetrative quality and profound effect of this type of stimulation has been discussed in a previous paper.

The advantages of the monopolar method are apparent in the fact that only a fraction of the current used in bipolar methods is here required to produce the same results, yet the depth of its effect is readily seen since currents as low as 3-5 ma. produce clonic movements of all extremities. This must mean that there is stimulation of the pyramidal tracts in the pons and medulla. Similar amounts of current applied through bipolar electrodes cause no such reactions.

The monopolar technic can be used in a number of different manners:

(1) Subconvulsive stimulation by applying subconvulsive doses to various prefrontal regions.

(2) Convulsive stimulation by applying electrode near vertex with current of 15 ma. for several secs.

(3) By combining (1) and (2) either following (1) by (2) or giving (2) and following with (1).

(4) Electrocerebral stimulation by stimulative currents other than AC are also being introduced by the monopolar technique; e.g., the Sedac current.

Advantages of the monopolar method are:

(1) In the specificity of the path of the current which maybe predetermined by the operator.

(2) Such specificity allows for a fraction of the currents hitherto necessary.

(3) Convulsions which are triggered by small amounts of current necessarily decrease the hazards of cerebral disturbance.

(4) Smaller currents cause less confusion.

(5) This method also lends itself to scientific research in investigational fields as, for example, to compare E.E.G. changes induced by applications of current to different areas of the brain.

Clinically the results parallel those of the conventional methods where convulsions are induced. In the electrocoma treatment it is felt that certain cases which failed to respond to convulsive E.C.T. or insulin coma did respond to electrocoma.

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Brain Measurements Electronically Determined and Correlated Physical Treatment: Basic Method

ALFRED E. EYRES, M.D., REUBEN REITER, SC.D., and
JOSEPHINE KNIGHT

Improved technics for measurement of mental condition especially in psychotics have urgently been needed. Many of us have used the Funkenstein test advantageously. This test, however, has limitations.

We wish to describe an electronic test procedure that may be more versatile and is without contraindication. Complex high frequency electric currents are applied to various brain areas and specific measurements in terms of minimum sensitivities and maximum tolerances are made. When tissue is pathological it is frequently hyposensitive. On the other hand, certain types of impaired brain function measure quite hypersensitive. It is only because of the high ratio of high frequency sensitivity to pain threshold tolerance that those measurements are made possible.

The technique of measuring sensitivities is exacting and may best be performed by a trained and skilled technician. A chart of the areas to be measured has been formulated. For example, we test left parietal to right parietal area, left occiput to right occiput area, frontal area to right arm, etc. When the test is completed certain areas may have responded normally, and others will have been found hyposensitive or hypersensitive. If response is entirely lacking the tissues are probably in degree more pathological. Variable degrees of hyposensitivity and hypersensitivity indicate disturbed central nervous system function.

Upon completing measurements, treatment is given where it is specifically indicated. Areas measuring within normal range are not treated. We have found as a result of our initial clinical experience that the principle of test measurement and subsequent directed treatment is correct. In cases where one area only is treated, we find therapeutic response and normalization of sensitivity in that area. On the other hand, areas needing treatment but deprived of the elements of therapy may remain in their unresponsive state and perhaps become even more pathological. Clinical response to treatment has frequently been very rapid, and may be expected to accelerate when carried out in accord with the theory of treatment where treatment is specifically indicated.

The test measurement procedure and the treatment profile are new. Both make use of the powerful yet delicate convulsive and non-convulsive currents of the Reiter S.O.S. Electrostimulator. If convulsive therapy is indicated, this instrument provides increased therapeutic dosage with minimum side effects. Following convulsive treatment the Sedac currents assist in relieving hallucinatory and delusional phenomena. Where depressive symptoms are absent or minimal and non-convulsive therapy is preferable, the superficial or deep application of high frequency current has been of special benefit in treatment of "hard core" cases. Therapy of the latter type we have come to designate as high frequency electric sleep. The monopolar techniques originated by Joseph Epstein[1] are especially useful in measuring and treating.

In the light of specific measuring methods, the following technics take on added significance: The temple-vertex stimulation of Friedman[2] and Wilcox;[3] the focal of Impastato;[4] the multipolar of Friedman; the endonasal of Breitner[5] and Friedman;[6] the peripheral of Jones[7] and his associates; and the double placements of Leo Alexander.[8]

It has been intensely interesting to clinically study, confirm, and correlate the testing and measuring and treatment technics. It is presently apparent that in diagnosis, treatment, and prognosis the high frequency currents may open for medicine a new field for investigation.

From St. Clair Hospital, Detroit, Mich.

Summary of Preliminary Findings

1. Seventy "normal" and approximately 300 "abnormal" brain measurements have been made.

2. Areas measured with bipolar technic were temple, parietal, jaw, occiput, left temple to right occiput, right temple to left occiput, and frontal to occiput. Areas measured with monopolar technic were from right arm to frontal, anterior vertex, left temple, right temple, left parietal, right parietal, left jaw, right jaw, and occiput.

3. Areas found most sensitive were bi-temporal, bi-parietal, and frontal occiput. Areas found lease sensitive were bi-occiput and bi-jaw.

4. Of "normal" subjects measured, the youngest was 15 and the oldest 63. Thirty were high school and college students, 20 were professional persons, the remainder miscellaneous.

5. Of "abnormals" test measured, most were psychotics and many were mixed psychotic and neurologic syndromes. The diverse findings are extremely interesting.

6. This work originated at St. Clair Hospital and most of the work has been carried on there. Additional test measuring and treating has been done on the Psychiatric Service of the Jennings Memorial Hospital, at Ypsilanti State Hospital, and at Wayne County General Hospital.

7. Of "normals" so far measured, it is apparent that some are "abnormal normals."

8. "Normal" test measurements vary somewhat but tend to fall within "reasonable" narrow limitations.

9. As measuring of "normals," organics and others has progressed, technical skills have improved. Furthermore, electronic translation of clinical requirements has undergone continuous change. These two factors are responsible for a certain degree of variation.

10. Cooperation of the patient in the testing procedure, whether a "normal" or an "abnormal," at times influences accurate measurement.

11. There are several fundamentals of measurement:

(a) The minimum sensitivity;

(b) The maximum tolerance;

(c) The span from minimum sensitivity to maximum tolerance; and

(d) Inconsistency of similar areas.

12. Measurement of minimum sensitivity can be precisely determined, but measurement of maximum tolerance is more difficult and less precise.

13. Many of the minimum sensitivities of "normals" and certain "abnormals" test within fractions of one "Sedac Unit."

14. In virtually all leads, the "normals" should not measure into high range.

15. Measurement into high range, especially into the higher reaches of high range, indicates central nervous system disorder.

16. A wide span more often than a narrow span is indicative of abnormality. Nevertheless, some "abnormals" measure within a very narrow span.

17. Statistical analysis of work thus far accomplished has not been undertaken. We believe that additional research should first be completed.

18. Therapeutically, high frequency currents have proven useful in the following: treatment of anxiety tension and fear states; as an aid in psychotherapeutic procedure; in therapy of headache and head pain, more especially "pure culture" textbook migraine, and in pain disorders of the fifth nerve.

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